

21PHYC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022

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) Explain the concept of time dilation.
b) Obtain expressions for radial and transverse velocity and acceleration of a particle. (2+7)
2. a) Show that Lorentz transformations reduce to Galilean transformations when $v \ll c$.
b) What is a conservative field? Show that the law of conservation of energy holds good in a conservative field. (2+7)

UNIT II

3. a) Write a short note on geosynchronous satellite.
b) Derive an expression for the areal velocity in terms of angular momentum and show that when angular momentum is conserved, the motion of a particle is planar and transverse acceleration is zero. (2+7)
4. a) Define moment of inertia and write the expression for moment of inertia of a disc about an axis perpendicular to its plane.
b) Derive the formula for Moment of inertia used in the experiment without neglecting the friction at bearings of the flywheel. (2+7)

UNIT III

5. a) Mention the applications of elasticity.
b) Derive an expression for the rigidity modulus of a torsional pendulum. (2+7)
6. a) Define Young's modulus and rigidity modulus of elasticity.
b) Define elastic potential energy. Derive an expression for the work done in stretching a wire. (2+7)

UNIT IV

7. a) Explain how small insects are able to move on the surface of water?
b) Derive the general expression for the excess of pressure due to surface tension inside a liquid surface. (2+7)
8. a) Explain interfacial tension between two liquids.
b) Using Stoke's method, derive an expression for the terminal velocity of the liquid. (2+7)

PART - B

Answer any three questions:

3×5= 15

9. Two stages of rocket 200 kg and 10 kg contain 800 kg and 90 kg fuel respectively. Calculate the final velocity attained with a maximum velocity of 1.5 km/s for the escaping gases.
10. What is the period of a compound pendulum formed by pivoting a meter scale through 75 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 uniform rod of length 1 m is clamped horizontally at one end. A weight of 0.1 kg is attached at the free end. Calculate the depression at the end point of the rod. The diameter of the rod is 0.02 m. Given $g = 1 \times 10^{10} \text{ N/m}^2$.
12. A plate of metal 100 sq cm in area rests on a layer of castor oil 2 mm thick whose coefficient of viscosity is 15.5 poise. Calculate the horizontal force required to move the plate with a speed of 0.03 m/s.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022

MATHEMATICS

Mathematics Theory - I

Duration: 2 Hours

Max Marks: 60

PART - A

Answer any SIX of the following:

6×2= 12

1. Find the remainder obtained upon dividing the sum $1! + 2! + 3! + \dots + 99! + 100!$ by 12 .
2. Define GCD and LCM .
3. Find the rank of the matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 1 & 2 \\ -1 & 2 & 2 \end{bmatrix}$ by direct method .
4. Define Hermitian and skew Hermitian matrix .
5. Define the centre of curvature at any point of a curve and write the formula for the co-ordinates of the centre of curvature .
6. Write the formula for derivative of arc in Cartesian and Parametric form .
7. Verify Rolle's theorem for $f(x) = x^2 + 3$ in $[-3, 3]$.
8. Find c of Cauchy's mean value theorem for the function $f(x) = x^2$ and $F(x) = x^4$ in $[1, 2]$.

PART - B

Answer any TWO of the following:

2×6= 12

9. Given integers a and b not both of which are zero the prove that there exist integers x and y such that $\gcd(a, b) = ax + by$.
10. Determine all solutions in the positive integers of the diophantine equation $54x + 21y = 906$.
11. Solve the system of congruences $x \equiv 1(\text{mod } 3)$, $x \equiv 2(\text{mod } 5)$, $x \equiv 3(\text{mod } 7)$ using Chinese remainder theorem.

PART - C

Answer any TWO of the following:

2×6= 12

12. Verify Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$.
13. Find the inverse of the matrix $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 0 & 0 \\ 1 & 4 & 1 \end{bmatrix}$ using elementary transformations .
14. By using elementary row operations , find solution or solutions if they exist, for the system : $x - y + 2z = 4$, $3x + y + 4z = 6$, $x + y + z = 1$.

PART - D

Answer any TWO of the following:

2×6= 12

15. Find the perpendicular length from the pole on the tangent to the curve $r(\theta - 1) = a\theta^2$.
16. Trace the curve $r = a \sin 3\theta$.
17. Find the pedal equation of the parabola $y^2 = 4a(x + a)$.

PART - E

Answer any TWO of the following:

2×6= 12

18. Determine the limits of the following:

(i) $\frac{e^x - e^{-x} - 2 \log(1+x)}{x \sin x}, x \rightarrow 0$.

(ii) $\frac{\log(x-2)}{\log(e^x - e^2)}$ as $x \rightarrow 2$.

19. Prove that if a function f is a continuous in $[a, b]$ and derivaible in $]a, b[$, then there exists at least one value of c in $]a, b[$ such that $f'(c) = \frac{f(b) - f(a)}{b - a}$

20. Determine the limits of the following :

(i) $(x - 1)^{x-1}, x \rightarrow 1$.

(ii) $(\frac{\tan x}{x})^{\frac{1}{x}}, x \rightarrow 0$.

21BOTC101

Reg No :

**CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022**

**BOTANY
Botany 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) Distinguish between acidic stain and basic stain.

OR

- 2) Explain Carl Richard Woese's three domain system.

UNIT 2

- 3) Differentiate between Phototrophic and Chemotrophic microbes.

OR

- 4) Write a note on growth measurements in microbes.

UNIT 3

- 5) Write the general characteristics of viruses.

OR

- 6) Comment on ITCC and MTCC.

UNIT 4

- 7) List the significances of VAM fungi.

OR

- 8) Write the causative organism, mode of transmission, symptoms and control measures of Little leaf disease of Brinjal.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Write the contributions of (i) Paul Ehrlich (ii) Dmitri Iwanowski (iii) Joesph Lister

OR

- 10) Explain the working principle and applications of Light microscope.

UNIT 2

11) Define dry heat sterilization.

Comment on i) Autoclave ii) Hot air oven iii) Laminar Air Flow chamber

OR

12) What is routine media? Explain the different types of routine media.

UNIT 3

13) Write a note on (i) characters of Prions (ii) Disease caused by prions.

OR

14) Explain the methods of preservation of culture.

UNIT 4

15) Write a note on (i) Soredium (ii) Isidium

OR

16) Write the causative organism, symptoms and control measures of Citrus canker.

21MICC101

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**CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022**

**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 short note on the contributions of Antony Van Leewenhoek and Martinus Beijerinck in the field of Microbiology.

OR

- 2) Explain the Louis Pasteur experiment to prove biogenesis with illustration.

UNIT 2

- 3) List different types of filters used for mechanical sterilization with an example for each.

OR

- 4) Write a note on Cryoprotectants.

UNIT 3

- 5) Write about Prokaryotic actin filaments.

OR

- 6) With a neat labelled diagram, explain the structure of Pili.

UNIT 4

- 7) Write briefly on and draw a neat labelled diagram of Cell membrane.

OR

- 8) With a neat labelled diagram describe the structure of Peroxisome.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

9) Write a note on Optical parts of a compound microscope with suitable diagram.

OR

10) Explain the origin of primitive cells and the evolution of microorganisms.

UNIT 2

11) Define Disinfection. Explain the uses of Aldehydes and Dyes in sterilization.

OR

12) Explain the procedure of smear preparation. Add a note on simple staining.

UNIT 3

13) Give a detailed account on size, shape and arrangement of microorganisms.

OR

14) Describe the process of Endospore germination in Bacteria.

UNIT 4

15) With a neat labelled diagram explain Mitochondria.

OR

16) Write a brief account on Vegetative methods of reproduction in lower eukaryotic microorganisms.

21STAC101

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022
STATISTICS
Statistics Theory - I

Duration:2 Hours

Max Marks:60

Answer any THREE of the following :

(3×2= 06)

1. Define class interval with an example.
2. Define stem and leaf diagram.
3. Define β_2 . How kurtosis is interpreted with the help of β_2 ?
4. Define standard error and probable error.
5. Define MGF of a random variable.

Answer any FOUR of the following in not more than a page each :

(4×6= 24)

6. Briefly explain the functions of statistics.
7. Find mean deviation from mean of $a, a+d, a+2d, \dots, a+2nd$.
8. Define the terms (i) Quartiles (ii) Deciles (iii) Percentiles
9. Briefly explain the concept scatter diagram.
10. Derive the regression equation of X on Y.
11. There are three candidates for the post of Principal of a college. They are Mr.Bhat, Mr.D'Souza and Mr.Ibrahim. Their chances of appointment as Principal are in the ratio 4:2:3. The probabilities of the three candidates introducing Computer science in the college respectively are 0.3, 0.5 and 0.8. If later it is found that computer science is introduced in the college, who might be the principal?

Answer any THREE of the following in not more than two page each :

(3×10= 30)

12. Obtain an expression for combined Harmonic mean.
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 case of bivariate data, how do you fit a curve of the type $Y=ax^b$?
15. State and prove the multiplication theorem of probability for any two events. What will happen if the events are independent?
16. a) If A is a subset of B, then show that $P(A) \leq P(B)$. (5)
b) If A_1, A_2, \dots, A_n are independent and $P(A_i) = 1/(1+i)$, then find the probability of occurrence of atleast one of them. (5)

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022
COMPUTER SCIENCE - I

Computer Fundamentals and Programming in C

Duration:2 Hours

Max Marks:60

PART A

Answer any FIVE questions:

(5×2= 10)

- 1) Write any two characteristics of a computer.
- 2) Write any four assignment operators in C.
- 3) What is an array? Write a C statement to declare an integer array.
- 4) Write the syntax of pointer initialization.
- 5) What is definition section? Give an example.
- 6) What are the advantages of using union?

PART B

Answer any FIVE questions :

(5×6= 30)

- 7) Explain system software with any two examples.
- 8) Explain with examples.
a) Integer datatype b) Floating point datatype c) Character datatype
- 9) Explain with syntax and example a) break b) goto
- 10) Explain the difference between array and structure.
11. Explain any three types of constants with examples.
12. Explain with syntax and example a) strcat() b) strcmp()

PART C

Answer any TWO questions :

(2×10= 20)

13. a) Explain any five symbols of flowchart.
b) Explain any three benefits and limitations of flowchart.
14. a) What are backslash character constants? Write any four with its meaning.
b) Write a note on C Keywords.
15. Explain with syntax and example a) if statement b) if-else statement

21CHEC101

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**CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022**

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 systematic error and random error.
2. What is meant by qualitative analysis? Give an example
3. Calculate mole fraction of NaOH in a solution of sodium hydroxide in water containing 10% NaOH by weight.
4. Give any two indicators used for a weak acid- strong base titration.
5. Explain with suitable example dehydrohalogenation.
6. Explain with suitable example Wurtz reaction.
7. Give reason: trans 2-butene is more stable than cis 2-butene
8. Define mesomeric effect and illustrate it.

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. What are the criteria to be considered to choose an analytical method?
b. Write a note on basic laboratory practices. (4+4)
10. a. Calculate by the least square method the equation of the best straight line for the calibration curve from the given data:

Conc of quinine (x1)	0.00	0.10	0.20	0.30	0.40
Intensity (y1)	0.00	5.20	9.90	15.30	19.10

- b. What are the precautions to be taken while handling toxic chemicals, concentrated/ fuming acids and organic solvents? (4 + 4)

UNIT II

11. a. Explain in detail the steps involved in gravimetric analysis.
b. Explain precipitation from homogenous solution. (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. State and explain Huckel's rule. How can this rule be employed to explain the aromaticity of organic compounds?
b. Explain with suitable example the mechanism of allylic addition of Bromine. (4+4)
- 14 a. Explain inductive effect with suitable examples.
b. Explain the different types of reagents. (4+4)

UNIT IV

15. a. Discuss briefly the relative reactivities of halogens in the halogenation of alkanes.
b. Explain the influence of chloro group in benzene nucleus on further substitution. (4+4)
- 16 a. How is chlorobenzene converted to aminobenzene? Give the mechanism of this reaction.
b. Explain the stability of carbocations. (5+3)

21ZOOC101

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION MARCH 2022
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) Write the salient features of the plasma membrane.

OR

- 2) Comment on the types of intermediate filaments.

UNIT 2

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

OR

- 4) Explain supercoiling of DNA.

UNIT 3

- 5) Explain Environmental sex determination with an example.

OR

- 6) What is Rh factor? Comment on Erythroblastosis foetalis.

UNIT 4

- 7) What is Trypanosomiasis? What are its types? Add a note on the vectors transmitting the infection.

OR

- 8) Describe the structure of filarial worm.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) With neat labelled diagrams explain Pinocytosis and Phagocytosis.

OR

- 10) Explain oxidative phosphorylation in mitochondria.

UNIT 2

11) Explain cell-cell interactions.

OR

12) Explain the regulation of cell cycle.

UNIT 3

13) Explain cytoplasmic inheritance with suitable example.

OR

14) What is incomplete dominance? Explain with Andalusian Fowl as an example.

UNIT 4

15) Write in detail about Human karyotyping and Pedigree analysis.

OR

16) Explain color blindness inheritance in humans.
