



27122(New)

B.Sc. I Semester Degree Examination, March/April - 2021

CHEMISTRY

Paper : I

(New)

Time : 3 Hours

Maximum Marks : 60

Instructions to Candidates:

1. Part - A : All are **Compulsory**.
2. Part - B : Solve any **Five** questions from **Seven** questions.

PART - A

1. Answer **All** the following questions. **(10×1=10)**

- a) Write schrodinger wave equation for hydrogen atom.
- b) Define electronegativity.
- c) What is equivalence point?
- d) What are carbenes? Give examples.
- e) What is Kolbes reaction?
- f) State Markownikoffs rule.
- g) How alkynides are formed?
- h) What is average velocities?
- i) Define intermolecular forces.
- j) Define unit cell.

PART - B

Answer the following any **Five** questions. (Each question carries **Ten** marks).

(5×10=50)

2. a) Define ionisation energy. Explain its trends in the periodic table. **(4)**
- b) State and explain Aufbau principle and Hund's multiplicity rule. **(6)**

[P.T.O.]



3. a) Describe acid-base titration. (4)
b) Explain Redox titration with example. (6)
4. a) What is hyperconjugation and electromeric effects? (4)
b) What is SN^1 reaction? Explain the mechanism of reaction with example. (6)
5. a) Explain free radical mechanism of chlorination of methane. (4)
b) Give any three general methods of synthesis of cycloalkanes. (6)
6. a) Give any two general methods of preparation of alkynes. (4)
b) Explain the addition reactions of alkynes with H_2O , HCN and Br_2 . (6)
7. a) Give the relationship between critical constant and Vander Wall's constants. (4)
b) Explain PV isotherm of real gases. (6)
8. a) Give the classification of structures of nematic and cholesteric phases. (4)
b) Derive Bragg's equation. (6)
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B.Sc. I Semester Degree Examination, March/April - 2021

MATHEMATICS

Algebra -I

Paper : 1

(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates : 1. Answer all the sections.

SECTION - A

I. Answer the following questions.

(10×2=20)

1. Find the Modulus and amplitude of $1+i$
2. Simplify $\left(\frac{\sin \theta + i \cos \theta}{\cos \theta + i \sin \theta}\right)^3$
3. Find the remainder when $f(x) = x^2 - 2x + 7$ is divided by $(x-1)$
4. Find the roots of the equation $x^3 - x^2 - 5x + 6 = 0$ by Synthetic division method.
5. Using Descartes' rule of signs find the number of positive and negative roots of $x^7 + 3x^5 - 4x^4 + 7x^2 - 4x - 3 = 0$
6. Increase the root of the equation $4x^4 + 32x^3 + 83x^2 + 76x + 21 = 0$ by 2.
7. Define, Symmetric and skew-symmetric matrix with example.
8. Define rank of a matrix.
9. Find the rank of matrix

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

[P.T.O.]



10. Verify Cayley-Hamilton theorem for a square matrix.

$$A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$$

SECTION - B

Answer any **Five** of the following.

(5×12=60)

II. 11. Simplify $\frac{(\cos \theta + i \sin \theta)^3 (\cos \theta - i \sin \theta)^{-8}}{(\cos 4\theta + i \sin 4\theta)^5 (\cos \theta + i \sin \theta)^2}$.

12. If $2 \cos \theta = x + \frac{1}{x}$ then prove that $x^{2n} - 2x^n \cos n\theta + 1 = 0$.

III. 13. Solve $x^4 + 4x^3 + 6x^2 + 4x + 5 = 0$ if 'i' is its root.

14. Solve $x^3 + 3x^2 + 3x + 28 = 0$ by removing the second term.

IV. 15. Transform $3x^4 - 4x^3 + 4x^2 - 2x + 1 = 0$ into another equation, whose leading coefficient will be unity.

16. Solve $x^3 - 27x + 54 = 0$ by Cardon's method.

V. 17. Solve $x^3 - 3x + 1 = 0$ by trigonometric method.

18. Solve $x^4 - 2x^2 + 8x - 3 = 0$ by Descarte's method.

VI. 19. Find the rank of $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & 1 & 2 \\ 6 & 2 & 5 \end{bmatrix}$ by using elementary operations.

20. Find the rank of matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 6 \\ 2 & 3 & 4 \end{bmatrix}$ by reducing to normal form.



(3)

27123(New)

VII. 21. Find the inverse of following matrix by using elementary operations.

$$\begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$$

22. Show that the following system has unique solution and hence solve.

$$x - y - z = 3$$

$$-x - 10y + 3z = -5$$

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

VIII. 23. Find the eigen values and eigen vectors of the matrix. $\begin{bmatrix} 4 & -1 \\ 1 & 2 \end{bmatrix}$

24. Verify Cayley-Hamilton theorem for $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$.
