

This question paper contains 2 printed pages.

Roll No. ...

5623

M.Sc. (Previous) Examination – 2024

CHEMISTRY

Third Paper-CH-403

(Physical Chemistry)

2745443

Time Allowed: Three Hours

Maximum Marks: 100

Attempt any five question in all selecting one question from each unit. All question carry equal marks.

Note: In each question paper 10 questions will be set. Candidates have to answer 5 questions selecting atleast one question from each unit.

No supplementary answer book will be given to any candidate. Hence the candidates should write the answer precisely in the main answer book only.

All the parts of one question should be answered at one place in the answer book. One complete question should not be answered at different places in the answer book.

### Unit-I

1. (a) Discuss Huckel theory of conjugated bond and charge density calculations. [10]
- (b) What is variation theorem? Apply this theorem to helium atom. [10]
2. (a) Give detailed description of postulates of quantum mechanics highlighting their significance. [12]
- (b) Explain Eigen function for angular momentum. [8]

### Unit-II

3. (a) Define activity and activity coefficient. How can Debye-Huckel theory be used to determine the activity coefficient of an electrolytic solution? [3+3+8=14]
- (b) Define ionic strength. Calculate ionic strength of 200ml 0.5M  $K_2SO_4$  solution. [3+3=6]
4. Write short notes on the following -
  - (a) Partial molar properties. [10]
  - (b) Partition functions and their applications. [10]

### Unit-III

5. What is enzyme catalysis? Derive Michaelis-Menten equation for kinetics of enzyme catalyzed reactions. How Lineweaver-Burk method may be used this rearranged equation for the determination of  $V_{max}$ ? [20]
6. Write short notes on the following -
  - (a) Collision theory of reaction rates. [10]
  - (b) RRKM theories of unimolecular reactions. [10]

#### Unit-IV

7. (a) What are macromolecules? What is the difference between macromoles and polymers? Describe the light scattering method for the determination of molecular mass of macromolecules. [2+2+6=10]
- (b) What do you mean by critical micellar concentration? Explain various factors affecting the CMC of surfactants. [10]
8. Write short notes on following - [6+6+8=20]
- (a) Thermodynamics of micellization.
- (b) Electrically conducting polymers
- (c) Chain configuration of macromolecules.

#### Unit-V

9. Discuss the basic principle of the polarographic method of analysis. By this technique metal ions can be estimated while non-metal ions not, explain. Derive the Ilkovic equation for the diffusion current in a polarographic cell. [4+4+12=20]
10. Write short notes on the following - [6+6+8=20]
- (a) Half wave potential and its significance.
- (b) Bockrts model of electrical double layer.
- (c) Quantum aspects of charge transfer at electrode-solution interfaces.

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