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Reg. No. : .....

Name : .....

First Semester M.Sc. Degree Examination, February 2025

Chemistry/Analytical Chemistry/Polymer Chemistry/Chemistry with Specialisation in Drug Design and Development

CH 213/CL 213/ PC 213/ CHDD 513 : PHYSICAL CHEMISTRY I

(2020 Admission Onwards)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer any **two** sub-questions among (a), (b), or (c) from each question. Each sub-question carries **2** marks

1. (a) What is Bohr probability interpretation of wave function?

   (b) What is Hermitian operator? What are its properties?

   (c) What is meant by quantum mechanical tunneling?

2. (a) Why Freundlich isotherm fails at high pressure?

   (b) What is Harkins Jura theory?

   (c) What is BET adsorption theory?

3. (a) What is Konowaloff first law?

   (b) What is Henry's Law?

   (c) What is van't Hoff reaction isochore

P.T.O.

4. (a) What is Lindemann theory?

(b) What is Hammett equation? What is its application?

(c) Discuss the kinetic salt effect

5. (a) What is the character of a matrix?

(b) What are the conditions for a set of elements to form a group?

(c) What is the significance of point groups?

(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. Each question carries **5** marks.

6. (a) Explain the application of quantum mechanics for a free particle in one dimensional box.

(b) Explain the postulates of time dependent Schrodinger equation.

7. (a) What is meant by physisorption? How is it differ from chemisorption?

(b) Briefly explain Langmuir adsorption isotherm.

8. (a) Explain the effect of temperature and pressure on activity coefficient.

(b) Describe the Maxwell relations of thermodynamics. What is its significance?

9. (a) Describe the Lindemann-Hinshelwood mechanism.

(b) Discuss the influence of solvents on rate of a chemical reaction.

10. (a) Discuss the relation between molecular symmetry and optical activity.

(b) Discuss the importances and consequences of great orthogonality theorem.

(5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions. Each question carries **10** marks.

11. What is Classical mechanics? Discuss its principle and limitations.

12. (a) Explain the mechanism and theories of heterogeneous catalysis.

    (b) Explain the principle and applications of transmission electron microscopy.

13. Derive Gibbs-Duhem equation. What are its applications?

14. (a) Explain Kinetics of consecutive and chain reactions.

    (b) Explain the various methods used for the study of kinetics of fast reactions.

15. Explain the classification of symmetry operations.

($3 \times 10 = 30$ Marks)
