(Pages : 3) **S – 6288**

Reg. No. : .....

Name : .....

First Semester M.Sc. Degree Examination, April 2024

Chemistry/Analytical Chemistry/Polymer Chemistry/Chemistry with Specialization 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 uncertainty in uncertainty principle? What is its consequence?

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

   (c) What are Eigen Values?

2. (a) What is Freundlich adsorption isotherm?

   (b) What are the advantages of low energy electron diffraction?

   (c) Describe Harkins - Jura adsorption method.

3. (a) What is Lewis Randall rule.

   (b) What is Konovalov second law?

   (c) What is the application of van't Hoff reaction isotherm?

P.T.O.

4. (a) What is Hinshelwood mechanism of chain reaction?

(b) What is the collision reaction theory? What is its limitation?

(c) What is the collision reaction theory? What is its limitation?

5. (a) What are Block factored matrices?

(b) What is similarity transformation?

(c) What are point groups?

(10 × 2 = 20 Marks)

SECTION – B

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

6. (a) What is Hermite polynomial? What is the application of Hermite polynomial?

(b) Describe the experimental proof of de Broglie concept.

7. (a) What is chemisorption? How is it differ from physical adsorption.

(b) Explain the thermodynamics of Langmuir adsorption isotherm.

8. (a) Derive Duhem–Margules equation.

(b) Explain the variation of fugacity with temperature and pressure.

9. (a) What does the transition theory state? How is it differ from collision theory?

(b) Describe the Rice-Herzfeld mechanism.

10. (a) Discuss the difference between reducible and irreducible representations.

(b) Explain the applications of character tables.

(5 × 5 = 25 Marks)

SECTION – C

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

11. Explain the postulates of quantum mechanics.

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

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

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

14. (a) Explain the Kinetics of parallel and opposing reactions.

    (b) Explain the various factors affecting reaction rates in solutions.

15. Explain the Great Orthogonality Theorem and its applications.

($3 \times 10 = 30$ Marks)

———————