A–0410

Total Pages : 3 **Roll No. .....**

MSCCH-508

M.SC. (CHEMISTRY) (MSCCH)

(Physical Chemistry-II)

Examination, June 2025

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

Long Answer Type Questions 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Derive Schrodinger wave equation to a system of harmonic oscillator. 19

2. (a) Describe the determination of molecular weight of a polymer by light scattering method. 11

   (b) How do you determine surface area of a catalyst using BET equation ? 8

3. What is meant by osmotic pressure and how do you obtain molecular weight of a molecular weight from this method ? What is mean by donnan effect and how do you minimize it ? 19

4. (a) Derive an expression for the energy of a rigid rotor using Schrodinger wave equation. 12

   (b) Calculate the de Broglie wave length of a body of mass 1 mg moving with a velocity of 10 m s^{-1}. 7

5. Discus the postulates of Quantum mechanics. 19

Section–B

Short Answer Type Questions 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Explain orthogonality and normalization of a wave function.

2. Discuss the following :

   (a) Physical interpretation of wave function

   (b) Hamiltonian and Laplacian operator

3. What do you understand by dual character of matter ? How was it verified ?

4. Establish a relationship between cartesian and polar coordinates.

5. What do you understand by number average and mass average molar mass of a polymer ? What is polydispersity index of a polymer sample ?

6. Derive Langmuir's unimolecular theory of adsorption.

7. Write BET equation and explain the terms involved in this equation. Discuss supplication of BET equation.

8. Explain orthogonality and normalization of a wave function.

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