

A-063

Total Pages : 4

Roll No.

MSCCH-508

M.Sc. CHEMISTRY (MSCCH)

(Physical Chemistry-II)

2nd Semester Examination, 2024 (June)

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.

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P.T.O.

1. (a) Define the terms adsorption, absorption, chemisorption and physisorption.
(a) Discuss briefly Langmuir's unimolecular theory of adsorption. Derive an adsorption for Langmuir's adsorption isotherm.
2. (a) What is meant by number average molar mass and mass average molar mass of a polymer? What is polydispersity index of a polymer sample?
(b) Describe light scattering method for the determination of molar mass of macromolecules.
3. (a) Derive thermodynamically the Gibbs adsorption isotherm for the separation of a solute on the surface of a liquid?
(b) Discuss about how temperature and pressure affect the adsorption.
4. (a) What is an operator? When are the operators said to commute? Explain with an example that the operators usually do not commute.
(b) Calculate the ground state energy (in eV and Cals) for an electron which is confined to one dimensional box having a width of 0.2 nm?
5. Solve Schrodinger wave equation to calculate the energy for one dimensional simple harmonic oscillator.

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. What do you mean by the term dual character of matter ?
Discuss and derive de Broglie’s equation.
2. Discuss the following :
 - (a) Orthogonality
 - (b) Degeneracy
 - (c) Observable
 - (d) Laplacian operator
3. Write various postulates of quantum mechanics.
4. Find out whether the function $\sin bx$ is an eigen function of following operator :
 - (a) d/dx
 - (b) d^2/dx^2

What is the corresponding eigen value, if any ?
5. Write a short note on Freundlich adsorption isotherm.

6. Discuss various applications of adsorption.
7. What are liquid crystals ? Discuss their applications.
8. (a) In the end group analysis experiments, if 0.8888 of the sample has consumed 0.88 ml of 0.18 N alcoholic KOH solution, calculate M_N of the polymer (Assume functionality as 2).

(b) If molecular weight of polyethene is 2×10^5 , what will be its degree of polymerization ?
