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MSCCH-508

Physical Chemistry-II

M.Sc. Chemistry (MSCCH)

2nd Semester Examination, 2023 (Dec.)

Time : 2 Hours] **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)

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.

(2×19=38)

1. (a) Deduce the Schrödinger wave equation for the rigid rotor.

(b) What are the conditions which an eigen function must satisfy?

2. (a) Write Schrödinger wave equation for hydrogen like atom in spherical polar coordinates. How can you separate the variables of this equation to get expressions each containing one variable only?

(b) Write any three postulates of quantum mechanics.

3. What is multimolecular theory of adsorption isotherm? What are the postulates of this theory? How is surface are estimated by BET equation?

4. Derive Gibbs adsorption isotherm from solution phase. What is the importance of this theorem?

5. Write short notes on the following:

(a) Isotactic Polymers.

(b) Syndiotactic polymers.

(c) Atactic polymers.

(d) Copolymers.

SECTION–B

(Short Answer Type Questions)

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. (4×8=32)

1. What do you understand by a normalized wave function? How do we normalize a wave function?

2. Write the expression for energy for the particle in one dimensional box. How can you justify?

(a) Quantization of energy.

(b) Existence of zero-point energy.

3. Briefly explain de Broglie hypothesis related to dual nature of matter. How has the dual nature of electron been verified experimentally?

4. Find out whether the function Cos ax is an eigen function of following operator :

(a) d/dx

(b) d^2/dx^2.

What is the corresponding eigen value, if any?

5. How is the molecular weight of macromolecules determined with the help of osmometry method?

6. (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?

7. Discuss about the factors influencing adsorption.

8. Write a short note on Freundlich adsorption isotherm.