

This question paper contains **3** printed pages]

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S. No. of Question Paper : **1838**

Unique Paper Code : **2173012012**

Name of the Paper : **DSE : Polymers, Colloids, Surfaces and Interfaces**

Name of the Course : **B.Sc. (Hons.) Chemistry**

Semester : **IV/VI**

Duration : **3 Hours**

Maximum Marks : **90**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *six* questions.

Each question carries **15** marks.

1.
 - (a) How are polymers classified on the basis of molecular forces ?
 - (b) Explain mechanism of coordination polymerization using an example.
 - (c) Discuss the kinetics of condensation polymerization. What are its unique features ? 5,5,5
2.
 - (a) Define Cohesive Energy Density and its relationship to the Hildebrand solubility parameter (δ).
 - (b) Explain the *two* distinguishable modes of solvent diffusion into a polymer.

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- (c) Write the complete Flory-Huggins equation for the Gibbs free energy change. Identify the entropic and enthalpic terms within the equation and explain the role of the interaction parameter. 5,5,5
3. Write short notes on :
- (a) Emulsion polymerization
- (b) Ionic polymerization
- (c) Upper Critical Temperature (UCLT) in polymer-solvent systems. 5,5,5
4. (a) What do you understand by the electrical double layer of colloids ? Explain its structure with the help of a properly labelled diagram.
- (b) Explain the terms coagulation and flocculation. Suggest any *two* methods to bring about the coagulation of a colloidal suspension.
- (c) Given *two* unknown samples of oil-in-water (O/W) and water-in-oil (W/O) emulsions, how will you distinguish between them ? 5,5,5
5. (a) Explain the phenomenon of capillarity. Give the capillary rise equation and explain the effect of tube radius, surface tension of liquid and density of liquid on capillarity.
- (b) What are aerosols ? How are the colloidal properties of aerosols different from those of other colloid like emulsions and sols.
- (c) How is the molecular behaviour of solid surfaces different from liquid surfaces ? 5,5,5

6. (a) What is the effect of pressure of gas on the extent of adsorption ?
Explain using the Freundlich adsorption isotherm.
- (b) What are the differences between macromolecular and associated colloids ?
- (c) Explain any *two* dispersion methods of preparation of lyophobic colloids. 5,5,5
7. (a) Describe the *two* morphological classes of foams with the help of suitable diagrams. Briefly explain the Gibbs-Marangoni effect.
- (b) What are Gibbs films ? Explain the Gibbs adsorption isotherm and its role in determining surface activity of a substance.
- (c) Briefly explain the microscopic mechanisms that contribute to adhesion. 5,5,5
8. Explain the role and application of colloid chemistry in the following :
- (a) Petroleum recovery
- (b) Delta formation
- (c) Sewage disposal. 5,5,5