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

Roll No. | | | | | | | | | | |

S. No. of Question Paper : **5698**

Unique Paper Code : **2173012012**

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

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

Semester : **IV**

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*) Define degree of polymerization and how it affects the molecular weight.

   (*b*) Explain bulk polymerization, its advantages and disadvantages.

   (*c*) Discuss in detail the criteria for solubility of any polymer. 5,5,5

2. (*a*) Discuss the kinetics of co-ordination polymerization. What are its unique features ?

   (*b*) How do ionic chain polymerization differ from radical chain polymerization ? Give *one* example of each- cationic initiator, anionic initiator and free radical initiator.

P.T.O.

(c) Derive the expression for the Gibbs free energy of mixing for polymer solution using Flory-Huggins theory. 5,5,5

3. (a) Explain mechanism of step growth polymerization using an example.

(b) Explain lattice theory of polymer solution. Why the entropy of mixing for polymer solutions is significantly lower than that for small molecule solutions ?

(c) Discuss the kinetics of copolymerization and derive copolymerization equation. 5,5,5

4. (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

5. (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 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

6. (*a*) What do you understand by hydrophile-lipophile balance (HLB) ? How is it relevant to the formation of oil-in-water (O/W) and water-in-oil (W/O) emulsions ?

(*b*) What are Langmuir-Blodgett films and how are they prepared ?

(*c*) What are aerosols ? Give any *four* methods of preparation of aerosols. 5,5,5

7. (*a*) How does the history of solid surfaces affect their properties ?

(*b*) Explain any *two* methods of characterizing the particle size and morphology of colloidal particles.

(*c*) In the context of solid-liquid interfaces, what do you understand by the terms wetting and spreading ? With the help of the Young's equation, explain how contact angle helps determine the extent of wetting and spreading. 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