B. Tech.
(SEM. IV) EXAMINATION, 2006-07
POLYMERIZATION ENGINEERING - I

Time : 3 Hours] 
[Total Marks : 100

Note : (1) Attempt all questions.
(2) Be precise in your answers.

1 Attempt any four parts of the following : 5×4=20

(a) Write five main differences in the Lab scale synthesis and industrial production of polymers?

(b) How the molecular weight of polymers can be controlled or regulated during polymerization?

(c) Give five reasons for using water as dispersion medium in Emulsion and suspension polymerization technique.

(d) How Zeigler-Natta catalysts introduce stereoregularity in Polymers?

(e) Write down the polymerization reactions for Urea Formaldehyde resin.

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2 Attempt any two of the following: \(10 \times 2 = 20\)

(a) Discuss the polymerization of LDPE with a neat flow sheet. What is the catalyst used? Describe the various types of reactors used?

(b) What are the various parts of a polymerization plant? Briefly describe important features of a polymerization reactor. What is the difference in batch and continuous process?

(c) Narrate the important differences in Emulsion and Suspension polymerization techniques with reciepe in pointwise fashion. Name three polymers produced commercially by each technique.

3 Attempt any two parts of the following: \(10 \times 2 = 20\)

(a) Describe the advantages and disadvantages of Tower process for production of polystyrene with a neat flow sheet? Name three important copolymers which are very useful; along with the property modified?

(b) Describe the Emulsion polymerization process with a reciepe and flow sheet. Discuss its suitability in terms of applications. What is “Clean” emulsion?

(c) Discuss the important copolymers of polypropylene and PVC along the applications. List the five industries which produces PVC.

4 Attempt any two of the following: \(10 \times 2 = 20\)

(a) Why polypropylene was commercialized after the discovery of Zeigler-Natta catalysts? Give a neat flow sheet with process condition for polypropylene production.
(b) Why copolymerization is an important technique for polymer modification? In some cases copolymers are more successful in comparison to pure polymer; Justify? Name various copolymers of PVC with few applications?

(c) Explain the significance and structure of a metallocene catalyst with two examples. Describe its polymerization mechanism.

5 Explain how with the same starting monomers two different types of phenolic resin are obtained, with the help of proper reactions? Discuss industrial production of Novolak resin with special emphasis on reactor.

OR

5 Narrate the various chemical reactions and steps involved in the production of Melamine formaldehyde resin. How it is cured, and how its moulding powder is manufactured?