

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
POLYMER ENGINEERING
(Chemical Engineering)**

Time: 3 hours**Max Marks: 80**

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Define degree of polymerization, repeat unit, mesomer, free radical.
(b) Write short notes on texture of polymers. [8+8]
2. Define the reactivity ratios r_1 and r_2 , and indicate their values for
 - (a) ideal
 - (b) alternating, and
 - (c) azeotropic co polymerization. [6+5+5]
3. (a) Explain briefly various factors that will influence the glass transition temperature
(b) Explain end group analysis method for the estimation of molecular weight for addition polymerization. [8+8]
4. What are the important properties to be consider to assess a given polymer as potential insulating polymer? Explain briefly each property. [16]
5. What is inhibition and name few inhibitors. Also explain the inhibition mechanism. [16]
6. Discuss the relative physical properties of polystyrene, impact polystyrene, and ABS resins and account for differences in terms of molecular structure. [16]
7. (a) Describe the processing of phenolic molding materials of different forms for applications.
(b) State the monomers and cross-linking agents employed to make phenol compounds. [8+8]
8. (a) What type of curing agents are used in molding techniques.
(b) Which type of plastic product does not require compounding?
(c) What is the modification of injection molding? What are their advantages? [6+4+6]

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1. Discuss some of the properties that make polymers useful materials and show how they result from the unique features of polymer structure such as high molecular weight.
2. Discuss in detail the following:
 - (a) Gel effect in radial polymerization.
 - (b) Temperature effect in radial polymerization. [8+8]
3. Define Glass transition temperature and explain briefly various methods for the estimation of glass transition temperature. [16]
4.
 - (a) Write short notes on chain end degradation.
 - (b) Explain briefly about random degradation.
 - (c) In some cases polymer degradation is advantageous. Explain with example. [6+5+5]
5. Write short notes on following:
 - (a) Free radical initiators.
 - (b) Coupling agents.
 - (c) Flame retardants
 - (d) Catalysts. [4x4=16]
6.
 - (a) Discuss the properties of LLDPE in relation to its branched chain structure.
 - (b) Write short notes on ABS resins. [8+8]
7.
 - (a) Describe the process to produce polyurethane foams. Mention two foaming agents used.
 - (b) Compare the properties of polyurethane with those of polystyrene foams. [8+8]
8.
 - (a) Explain in detail the general characteristics of extrusion die.
 - (b) Write short notes on compression molding. [8+8]

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1. (a) Explain briefly the classification of polymers based on polymer structure
(b) Define: polymer, configuration, conformation, repeat unit. [8+8]
2. Contrast the kinetics of suspension and emulsion polymerization and discuss the relative merits of the two methods. [16]
3. (a) Explain briefly various factors that will influence the glass transition temperature.
(b) Explain briefly the importance of glass transition temperature. [8+8]
4. (a) Write short notes polymer solubility.
(b) Define solubility parameter? How to determine this. [8+8]
5. What are the lubricants and flow promoters? What are the internal and external lubricants? What is the effect of lubricants on the properties of polymers? [16]
6. Give structural differences of isotactic, syndiotactic and atactic polypropylene. How is isotactic polypropylene is prepared? Compare the important characteristics of the isotactic polypropylene with atactic polypropylene. [16]
7. (a) Suggest two methods of fabrication for an epoxy resin.
(b) Write chemical formulas of each type of repeat unit found in epoxy resin.
(c) State one advantage and one disadvantage of amino resins in comparison to phenolic resins. [4+6+6]
8. (a) What type of curing agents are used in molding techniques.
(b) Which type of plastic product does not require compounding?
(c) What is the modification of injection molding? What are their advantages? [6+4+6]

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1. (a) Discuss the occurrence, chemical composition, method of extraction and application of shellac.
(b) What are bio-polymers? Give few examples and also write the applications.
2. Define the reactivity ratios r_1 and r_2 , and indicate their values for
 - (a) ideal
 - (b) alternating, and
 - (c) azeotropic co polymerization. [6+5+5]
3. (a) Explain light scattering photometer with neat sketch.
(b) Describe dynamic light scattering and neutron scattering. [8+8]
4. What is polymer degradation? Also explain briefly about various types polymer degradation with examples. [16]
5. Write short notes on following:
 - (a) Anionic initiators.
 - (b) Fillers
 - (c) Cross-linking agents.
 - (d) Stabilizers [4x4=16]
6. (a) Discuss the properties of LLDPE in relation to its branched chain structure.
(b) Write short notes on ABS resins. [8+8]
7. (a) What are the raw materials used for the production of polyurethane? Also write chemical equations for the polymerization as practiced industrially.
(b) What are the advantages of melamine formaldehyde powders over urea formaldehyde powders? [8+8]
8. Explain in detail the working principle of hot runner molds and runner less injection molds. Also compare hot runner injection molds with runner less molds. [16]
