

Roll No.

--	--	--	--	--	--	--	--	--	--	--

**B.E / B.Tech ( Full Time ) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014**

**Materials Science & Engineering**

**Semester: III**

**CY 8302 POLYMER SCIENCE AND ENGINEERING**

**(Regulation 2012)**

**Time: 3 Hours**

**Answer ALL Questions**

**Max. Marks 100**

**PART-A (10 x 2 = 20 Marks)**

1. How do addition and condensation polymerizations differ from each other?
2. What is gel point?
3. Why does a polymer has average M.W. rather than a single absolute M.W.?
4. Define number and weight average molecular weights.
5. What is meant by glass transition temperature?
6. Which is more brittle, semi-crystalline materials or amorphous? Why?
7. Define cohesive energy density and solubility parameter.
8. 'Dilatant behavior can cause processing difficulties' – Why?
9. What are the points to be considered in the selection of solvent for dry spinning?
10. What are the advantages of extrusion over other plastics molding processes?

**Part – B ( 5 x 16 = 80 marks)**

11. (i) Compare and explain the steps involved in cationic and anionic polymerisation. 10
- (ii) Draw an exhaustive chart classifying macromolecules in different possible ways. 6

12. a (i) Explain with suitable diagram the working principle of GPC. 10
- (ii) Explain with suitable examples how molecular weight and molecular weight distribution affect polymer properties. 6

**OR**

b) Write short notes on the following.

- (i) Polydispersity index and conversion of polymer. 8
- (ii) Membrane osmometry method for determination of molecular weight. 8

13 a. (i) Define first order and second order transition in polymers. What is the effect of molecular weight on glass transition temperature? 10

(ii) Show with suitable examples the effect of restricting groups on glass transition of polymers. 6

**OR**

b. (i) Enlist the differences between crystallinity and crystallizability. Is it possible to obtain 100% crystalline and 100% amorphous polymers? Explain. 8

(ii) Write a note on the growth and structure of spherulites in crystalline polymers and the arrangement of molecules in the spherulites. 8

14 a. (i) Compare and contrast the dissolution process of low molecular weight solute and high molecular weight polymers. 10

(ii) What is Hildebrand's solubility parameter? State its limitations. How is the solubility parameter related to the heat of mixing? 6

**OR**

b.(i) Explain the terms: Shear Thinning and Shear Thickening. 8

(ii) What is melt fracture and what causes it? Explain die swell. 8

15.a (i) Explain with neat sketches, the three equipment techniques used to produce coextruded structures. 9

(ii) Illustrate thermoforming process with the help of a suitable item obtained out of it. 7

**OR**

b) Explain in detail, the principle behind the processes of injection molding, reaction injection molding (RIM) and reinforced reaction injection molding (RRIM). 16

\*\*\*\*\*