

2072

M. Tech. (Material Science and Technology)
Second Semester
MT-203: Polymers

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory.

x-x-x

1. (a) What are stereoregular polymers? Which catalyst produces stereoregular polymers?
- (b) Are polymers and plastics synonyms? Explain.
- (c) Which biomedical polymer is suitable for (i) contact lens (ii) yarn for surgery (iii) heart valves (iv) dental restoratives?
- (d) Explain one application of liquid crystal polymer.
- (e) What are the various ways to initiate free radical polymerization?

(2 X 5)

2. (a) What are chain transfer reactions? Describe their effect on the molecular weight and density of the polymers obtained in their presence.
- (b) Derive an expression for degree of polymerization in cationic addition method. Why these are carried at low 'T' and what is the effect of solvent polarity on it?

(5, 5)

3. (a) Discuss in detail the method of emulsion polymerization. What are its advantages? Which polymerization technique is used to synthesize nylon 6, 6?
- (b) Give various advantages and disadvantages of bulk polymerization method.
- (c) Discuss different properties of polymers based on liquid crystal behavior.

(4, 3, 3)

P.T.O.

(2)

4. (a) Equal weights of polymer molecules with $M_1=10,000$ and $M_2=100,000$ are mixed. Calculate the poly-dispersity index (PDI).

(b) Discuss molecular weight determination of polymers using viscosity measurements.

(c) What is the purpose of different types of averaging of molecular weights of polymers?

(3,4,3)

5. (a) Explain which technique is used to make (i) thin films or sheets of any polymer (ii) cheapest method to produce common plastic products.

(b) What are PHAs? Discuss synthesis of PHAs. What are their properties and applications?

(5,5)

6. (a) Compare and contrast the properties of natural and synthetic fibers.

(b) Discuss non chain scission of polymers and chemical reactions of cellulose.

(c) Arrange polyethylene, polypropylene and Nylon 6,6 in increasing order of T_g giving reasons.

(3,4,3)

7. (a) Discuss why polymers are most suitable materials for biomedical applications.

(b) Discuss the industrial applications of water soluble polymers.

(c) What is "Green Polymer Synthesis and Processing"? How can it reduce the ill-effects of conventional polymer production?

(3, 3, 4)