Exam.Code:1030 Sub. Code: 7858

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

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt <u>five</u> questions in all, including Question No. I 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 (ii) heart valves (iii) dental restoratives?
- (d) Explain one application of liquid crystal polymer.
- (e) What are the various ways to initiate free radical polymerization?

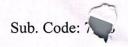
 (2×5)

- 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)



4. (a) Equal weights of polymer molecules with M1=10,000 and M2=100,000 are mixed. Calculate the poly-dispersity index (PDI).

(2)

- (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 $T_{\rm g}$ 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)