2063
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 and selecting two questions from each Part.*

x-x-x

1 (a) What is meant by living polymer?

(b) What is the number average degree of polymerization (DP) of polystyrene with M_n 100,000?

(c) Are polymers and plastics synonyms? Comment.

(d) Which biomedical polymer is suitable for (a) contact lens (b) yarn for surgery?

(e) What are the various ways to initiate free radical polymerization?   (5 X 2)

PART - A

2. (a) 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)

(b) What are chain transfer reactions? Describe their effect on the molecular weight and density of the polymers obtained in their presence.   (5)

3. (a) Distinguish between number-average, weight-average, and Z-average molar masses. Discuss experimental techniques that can measure each of these properties.   (6)

(b) What is poly dispersity index (PDI)? Calculate the PDI of a mixture of two polymers, one having $M = 62$ kg mol^{-1} and the other $M = 78$ kg mol^{-1}, with their amounts (numbers of moles) in the ratio 3:2.   (4)

4. (a) What are the factors influencing the crystallinity in polymers? What will be the effect of crystallinity on properties of polymers?   (6)

(b) Explain the thermal degradation behavior of polytetrafluoro phenylene.   (4)

PART - B

5. (a) Explain the moulding in processes of polymer manufacturing.   (6)

(b) Discuss the synthesis of cyclized rubber from natural rubber.   (4)

6. (a) What are extrinsically conducting polymers? What are their various applications?   (5)

(b) Discuss non chain scission of polymers and chemical reactions of cellulose.   (5)

7. (a) Explain with example the conduction mechanism of conducting polymers.   (4)

(b) Write short notes on the following:

(i) non-linear optical polymers (ii) bio-medical polymers.   (2 X 3)

x-x-x