BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER : VII**
BRANCH: CHEMISTRY **SESSION : MO/18**

SUBJECT: TPT1021 PRINCIPLES OF POLYMER TECHNOLOGY

TIME: 03:00 **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Define Polymer and write detailed notes on history of development of polymers. [6]
Q.1(b) Classify polymers based on different parameters and draw overall chart for polymer classification. [6]

Q.2(a) Describe theory of addition and condensation polymerization with examples. Also indicate which type of mechanism is conventionally assigned to each type of polymerization. [6]
Q.2(b) Describe the concepts of copolymerization and radiation polymerization with examples. [6]

Q.3(a) Write detailed notes on block and graft copolymerization with examples. [6]
Q.3(b) Describe molecular ratio and reactivity and explain techniques used to quantify them. [6]

Q.4(a) Enlist various types of viscosity associated with polymer solutions and define any two in detail. Also describe the procedure for estimation of polymer molecular weight using Ubbleholde viscometer. [6]
Q.4(b) List the techniques that can be used for polymer molecular wt. estimation, if (i) polymer is soluble in solvent (ii) polymer is insoluble in solvent. Explain any one method corresponding to each in detail. [6]

Q.5(a) Define T_g and T_b and show how T_g is extracted from a typical DSC plot with exo-up and endo-up. Also list the factors affecting T_g and write the various properties obtained from a DSC curve. [6]
Q.5(b) Describe in detail the two configuration modes of conventional DSC. Explain how modulated DSC is different from conventional DSC and enlist names of various clamp geometries available in DMA. [6]

Q.6(a) Differentiate LDPE and LLDPE. Explain one production method for each in detail with figures. [6]
Q.6(b) Describe all the methods used for polystyrene production with figures where applicable. [6]

Q.7(a) List the conditions for a polymer to be conductive. Write the structures of six common conductive polymers and explain the synthesis methods of any two polymer in detail. [6]
Q.7(b) Write short notes on (i) photoresponsive polymers (ii) optical properties of polymers (iii) Magnetic polymers. [6]

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