

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

CLASS: BE
BRANCH: CHEM. POLYM. & PLAST.

SEMESTER : IV
SESSION : SP/19

SUBJECT: PC4001 MACROMOLECULAR SCIENCE I

TIME: 3:00 HOURS

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.
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- Q.1(a) How are polymer classified according to (i) their structure, (ii) their tacticity and their origin/source? [6]
Q.1(b) What do you understand by tacticity in polymers? What are degree of polymerization and functionality? [6]
- Q.2(a) What is the crystallinity? What are the factor on which the strength and crystalline nature of the polymer depend? [6]
Q.2(b) Explain, why the T_g is greater for polymers with high mol. wt. in comparison to the low mol. wt. polymers. Factors affecting the Glass Transition Temperature. [6]
- Q.3(a) Describe functionality of monomers with unsaturation and relative functional groups? Distinguish between homo and copolymer with suitable examples. [6]
Q.3(b) Write short note on (i) molecular weight distribution and its significance and (ii) difference between thermoplastics and thermosets [6]
- Q.4(a) What is the difference in viscosities of low molecular weight solution and polymer solution? What do you mean by combinatorial entropy? [6]
Q.4(b) Explain the thermodynamics of polymer solution using a lattice-based approach. [6]
- Q.5(a) How crystallinity of the polymer affects its solubility and T_g ? [6]
Q.5(b) How the tensile properties of the polymer affects by side-groups in the backbone chain? [6]
- Q.6(a) Discuss the emulsion polymerization method of the polymer synthesis. [6]
Q.6(b) Why monomer used in step-growth polymerization yield long chain polymers? What polymer is formed when (i) adipic acid reacts with 1,6-diamino hexane and (ii) terephthalic acid reacts with ethylene glycol. [6]
- Q.7(a) Describe the properties and use of (i) cationic surfactant and (ii) anionic surfactant. [6]
Q.7(b) What are micelles? Explain the different types of micelles and their size variation with respect to concentration. [6]

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