

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

CLASS: BE  
BRANCH: CHEM. ENGG. -PLASTICS & POLYMER

SEMESTER : V  
SESSION : MO/18

SUBJECT: PC5003 MACROMOLECULAR SCIENCE - II  
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.
- 

- Q.1(a) Define average functionality of stoichiometric and non-stoichiometric mixture. [2]  
Q.1(b) In the polymerization of hexamethylene diamine and adipic acid, a 2 % excess of adipic acid is present. Calculate degree of polymerization of the polymer formed for 98 % conversion. [4]  
Q.1(c) Discuss the conditions for i) Branching and ii) Cross-linking in polycondensation polymerization. [6]
- Q.2(a) Discuss the applications of Carothers equation. [2]  
Q.2(b) Discuss the effect of stoichiometric imbalance on molecular weight of polycondensation polymers. [4]  
Q.2(c) Write short notes on: Interfacial Polymerization [6]
- Q.3(a) How would you experimentally determine whether the polymerization of an unknown monomer X was proceeding by a step or a chain mechanism? [2]  
Q.3(b) Discuss auto-acceleration effect in radical polymerization. [4]  
Q.3(c) Discuss the mechanism and kinetics of chain growth polymerization. [6]
- Q.4(a) What is kinetic parameter? How can you evaluate its value? [2]  
Q.4(b) What are inhibition and retardation? Discuss with suitable example and graph. [4]  
Q.4(c) Discuss the thermodynamics of addition polymerization. [6]
- Q.5(a) What is living polymerization? Give an example. [2]  
Q.5(b) Write short notes on: Ideal copolymerization and Alternating copolymerization [4]  
Q.5(c) Discuss the mechanism of formation of isotactic PP by bimetallic mechanism. [6]
- Q.6(a) Cite the instances in which cross-linking degradation reactions are desirable. [2]  
Q.6(b) What is mechano-chemical degradation? Discuss in detail with an example. [4]  
Q.6(c) Discuss the mechanism of oxidative degradation. How can you prevent this type of degradation? Discuss in detail. [6]
- Q.7(a) What are the ingredients used in emulsion polymerization? [2]  
Q.7(b) Write short notes on: Suspension polymerization [4]  
Q.7(c) What are the advantages and disadvantages of bulk, solution, suspension and emulsion polymerization? [6]

:::::28/11/2018:::::E