

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86**  
**(For candidates admitted from the academic year 2009–10 & thereafter)**

**SUBJECT CODE: CH/PE/PL23**

**M. Sc. DEGREE EXAMINATION, APRIL 2011**  
**BRANCH IV- CHEMISTRY**  
**SECOND SEMESTER**  
**REG.NO .....**

**COURSE : ELECTIVE**  
**PAPER : POLYMER CHEMISTRY**  
**TIME : 30 MINUTES**

**MAX. MARKS: 20**

**SECTION – A**

**TO BE ANSWERED ON THE QUESTION PAPER ITSELF.**

**Answer all the questions: (20 X 1 = 20)**  
**I Choose the Correct answer: (10 X 1 = 10)**

1. Polyethylene is obtained by the polymerization of  
(a) Ethylene (b) Styrene  
(c) Vinyl chloride (d) Methyl acrylate
2. A polymer whose backbone is essentially made up of carbon atom is called  
(a) Inorganic polymer (b) Organic polymer  
(c) Thermosetting polymer (d) Natural polymer
3. A polymer vulcanized into rubbery products exhibiting good strength and elongation, it is used as  
(a) Elastomers (b) Plastics  
(c) Fibres (d) Liquid resins
4. How is viscosity related to molecular weight in the case of dilute polymer solutions?  
(a) not proportional (b) directly related  
(c) half the molecular weight (d) twice the molecular weight
5. Glass transition temperature is commonly called as  
(a) First order transition (b) Second order transition  
(c) Zero order transition (d) None of the above
6. Softening temperature is determined by  
(a) DSC (b) HDT  
(c) TGA (d) GPC
7. Polymer degradation means  
(a) Reduction in the molecular weight of the polymer  
(b) Increase in the molecular weight of the polymer  
(c) Controlled change in the molecular weight of polymer  
(d) None of the above

8. The degree of polymerization is expressed as  
(a) Molecular weight of the monomer  
(b) Molecular weight of the polymer  
(c) Ratio of molecular weight of the monomer to that of the polymer  
(d) Ratio of molecular weight of the polymer to that of the monomer
9. A Polydispersity index value of 1.5 – 2 is obtained for  
(a) Cationic chain polymerization (b) Co-ordination polymerisation  
(c) Ring opening polymerization (d) Free-radical chain polymerization
10. The glass transition of a polymer is influenced by its molecular weight up to a value of  
(a) 10,000 (b) 30,000  
(c) 20,000 (d) 40,000

**II. Fill in the blanks:****(5 x 1 = 5 marks)**

11. Chain branching is favoured in \_\_\_\_\_ polymerization due to chain transfer to all ready formed polymer molecules.
12. The conversion of an uncrossed thermo setting resin into a cross linked network is called \_\_\_\_\_.
13. Chain transfer reaction results in \_\_\_\_\_ polymers
14. Water soluble monomers can be polymerized by \_\_\_\_\_ technique
15. Polymerization reaction of olefins and dienes catalysed by organo metallic compounds are classified as \_\_\_\_\_ polymerization.

**III. Answer in one or two lines****(5 x 1 = 5 marks)**

16. Importance of glass transition temperature.
17. Crystallisability
18. Optical isomerism in polymers
19. Account for high thermal stability of Teflon
20. Anti oxidants



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**TIME : 2 HOURS & 30 MINS**

**MAX. MARKS: 80**

**SECTION - B**

**I Answer any Five out of Seven Questions (5 x 8 = 40 marks)**

1. What is the role of an initiator in FRP? Explain the mechanism giving example.
2. What do you understand by bulk and solution polymerization?
3. Differentiate between addition and condensation polymers. Give examples.
4. Define number average and weight average molecular weight.
5. Define high polymers, oligomers, homopolymers and co-polymers.
6. Give any one method of determination of molecular weight of a polymer.
7. What are the various factors influencing polymer degradation? Explain.

**SECTION - C**

**II Answer any Two out of Three Questions (2 x 20 = 40 marks)**

8. Give the structure, properties and applications for the following with one example in each category
  - (i) Natural polymer
  - (ii) Biomedical polymer
  - (iii) Composites
  - (iv) Thermal degradation of polymer (4x5)
9. (a) Give the relation between the molecular weight of polymer solutions with
  - (i) Osmotic pressure.
  - (ii) Viscosity.
  - (iii) Solubility. (3x5)(b) Briefly discuss co-ordination polymerization. (5)
10. (i) Discuss the deformation behavior of polymeric material through Hook's and Newton's equation.
  - (ii) Briefly explain on any 2 methods of basic polymer processing operations.
  - (iii) How is the polymer characterized through FTIR and NMR? Explain giving an example.
  - (iv) Discuss briefly on the mechanical properties and thermal properties of a polymer. (4x5)

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