

B. TECH.**THEORY EXAMINATION (SEM-IV) 2016-17****POLYMER SCIENCE & TECHNOLOGY****Time : 3 Hours****Max. Marks : 100****Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.****SECTION – A**

- 1. Attempt all parts of the following questions: 10 x 2 = 20**
- a) What are cross linked polymers and branched polymers.
 - b) What do you understand by tacticity in polymers ?.
 - c) What are degree of polymerization and functionality ?
 - d) Write the structure of repeating units in ABS polymers.
 - e) Explain, why the T_g is greater for polymers with high mol. wt. in comparison to the low mol. wt. polymers.
 - f) Give the reason, why does the elastic behaviour of PVC decrease with the inclusion of impurity ?
 - g) What are inhibitor? Give its significance.
 - h) Differentiate between condensation and addition polymerization.
 - i) What are alternate co-polymers & Graft co-polymers ?
 - j) Polytetrafluoro ethylene is a thermoplastic but behaves like a thermoset polymer, explain.

SECTION – B

- 2. Attempt any five parts of the following questions: 5 x 10 = 50**
- a) What are elastomers. Describe preparation, properties and applications of SBR (Buna – S).
 - b) (i) What are initiators? Show addition polymerization through the generation of free radicals by the decomposition of benzoyl peroxide.
(ii) A polymer sample consists of 10% by weight of macromolecules of molecular weight 10000 and 90% by weight of macromolecules with M. Wt. 1,00,000. Calculate the average M_n and average M_w .
 - c) (i) Describe in detail the polymer Emulsion polymerisation.
(ii) Calculate the number average degree of polymerization of an equimolecular mixture of hexamethylene diamine and adipic acid for the extent of reaction 0.500, 0.800, 0.900, 0.950, 0.970, 0.990 and 0.995.
 - d) Discuss the kinetics of free radical polymerization. Obtain expression for degree of polymerization.
 - e) What are high performance polymers? Give the preparation, properties and applications of PMMA & PC.
 - f) What are composite polymers? Give any two methods for the processing of composite polymers.
 - g) (i) Discuss the mechanism for condensation polymerization.
(ii) 104 gm of styrene was polymerized by radical polymerization process and D_p was found to be 1000. Calculate the number of molecules of polystyrene produced.

- h) What is Ziegler Natta Catalyst. Give the mechanism of co-ordination polymerization. What is the significance of it over free radical polymerization.

OR

Classify the polymer on the basis of:

- | | |
|------------------------|------------------------|
| (i) Origin | (ii) Ultimate form |
| (iii) Stereoregularity | (iv) Thermal Behaviour |

SECTION – C

Attempt any two questions of the following:

2 x 15 = 30

3. Differentiate between:
- (i) Thermosetting and Thermoplastic polymer
 - (ii) Suspension and Emulsion Polymerization
 - (iii) Buna-S and Buna-N
4. Discuss in detail: (Any three)
- (i) Vulcanization
 - (ii) Polyamides
 - (iii) Phenol Formaldehyde
 - (iv) Applications of polymers in bio-medical and space
5. (i) What are the effects of polymer structure on its properties?
(ii) Explain the preparation, properties and important properties of PVA
(iii) Factors affecting the Glass Transition Temperature