

This question paper contains 4 printed pages]

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S. No. of Question Paper : 5756

Unique Paper Code : 6092011101

Name of the Paper : Introduction to Polymer Science

Name of the Course : B.Sc. (H) Polymer Science

Semester : I

Duration : 3 Hours

Maximum Marks : 90

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt six questions in all.

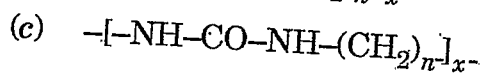
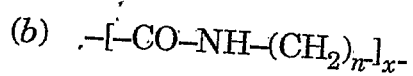
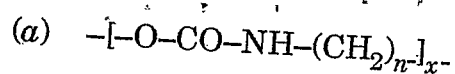
Question No. 1 is compulsory.

Use of calculator is allowed.

1. (i) Discuss main reasons for the predominance of *trans* states in crystalline polyethylene.
- (ii) For a crystallizable polymer, crystallinity is much higher if it is crystallized from dilute solution than the melt stat. Justify this statement.
- (iii) Discuss advantages of flexural test over tensile test.

P.T.O.

(iv) Consider the following polymers :



For fixed value of n and x , discuss order of hydrophobic nature, density and tensile strength.

(v) Discuss effect of free volume on glass transition temperature. 5×3

2. (i) Discuss salient features of fringed micelle model.

(ii) Why glass is called super cooled liquid ? Explain.

(iii) Show that the end-to-end distance of the freely jointed chain is expanded by a factor of when there is restriction to bond angles. Assume that the bond angle is tetrahedral.

5,5,5

3. (a) Write possible structural and stereoisomers obtained from addition polymerization of butadiene.

(b) Show that the end-to-end distance of the freely jointed chain is expanded by a factor of when there is restriction to bond angles. Assume that the bond angle is tetrahedral.

(c) Illustrate tacticity and diisotacticity of polymers with suitable examples.

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4. (a) Illustrate breakdown voltage and power factor of a polymer. 5,10
- (b) Explain the following :
- (i) Toughness
 - (ii) Brittleness
 - (iii) Yield point
 - (iv) RMS end to end distance
 - (v) Solubility parameter.
5. (a) Draw a log modulus-temperature plot for an amorphous polymer. What are the *five* regions of viscoelasticity, and where do they fit ? To which regions do the following belong at room temperature : chewing gum, rubber bands, PMMA ?
- (b) Discuss the principle of Florry Huggins theory.
- (c) Give detailed classification of polymers on the basis of end use. 5,5,5
6. (a) What is the role of molecular weight in determining properties of a polymer ? Elaborate with examples.
- (b) Discuss heterogeneity of molecular weight of a polymer.
- (c) Explain the following fluids with examples : 5,5,5
- (i) Pseudoplastic
 - (ii) Rheopectic.

7. (a) Calculate the molecular weight of the polymer having $\text{-HN-(CH}_2\text{)}_5\text{-CO-}$ as repeating unit if the degree of polymerization is 1000.
- (b) Define conformation of a polymer. Discuss stable conformations with suitable examples.
- (c) Explain the relationship of molecular size with intrinsic viscosity.

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