

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- V<sup>th</sup> SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 152302****Date: 02/06/2012****Subject Name: Physics of Plastics****Time: 02:30 pm – 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Discuss In Detail , The Flory Huggins Theory **07**  
 (b) Discuss In Detail, The Gel Permeation Chromatography **07**

- Q.2** (a) Discuss the process of polymer dissolution in detail **07**  
 (b) 1. Differentiate between polymer conformation v/s. polymer configuration. **07**  
 2. Differentiate between Amorphous v/s. Crystalline polymers.

**OR**

- (b) 1. Discuss Theta Temperature **07**  
 2. Discuss Radius of gyration.

- Q.3** (a) Discuss factors affecting crystallinity. **07**  
 (b) Discuss RANDOM WALK Probability **07**

**OR**

- Q.3** (a) Discuss measurement of Mn by osmotic pressure **07**  
 (b) What is Chain length and contour length? Calculate the chain length and contour length of a PE molecule whose –C-C- chain is 1.54Å and bond angle is 109° 28'. Assume n=1000. **07**

- Q.4** (a) What is intrinsic viscosity ? Discuss Mark Houwink equation and its significance **07**  
 (b) Discuss Gaussian distribution **07**

**OR**

- Q.4** (a) Define : Crystallites ; Spherulites ; Rayleigh ratio ; Mesogens'; polymer fractionation ; Viscoelasticity; entropy **07**  
 (b) Discuss the Boltzmann's superposition Principle **07**

- Q.5** (a) Discuss maxwell's model **07**  
 (b) Discuss Size Exclusion Chromatography **07**

- Q.5** (a) What is the difference between dissolution of low molecular weight compounds and polymers in a solvent. Discuss in detail **07**  
 (b) What is mean end to end distance? Consider an ideal polyethylene chain with molar mass  $M=10^5$  g/mol; where  $a=6$  . Its mean end to end distance is given by **07**

$\langle R^2 \rangle = Cb^2N$ , where the monomer length is  $b=2.5\text{\AA}$  and the coefficient  $C=5.5$ , Estimate its root end square end to end distance  $\sqrt{\langle R^2 \rangle}$  if the molar mass  $M_{\text{mon}} = 28$  g/mol.

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