

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – SUMMER 2013****Subject Code: 152302****Date: 16-05-2013****Subject Name: Physics of Plastics****Time: 10.30 am - 01.00 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 factors affecting crystallinity **07**
 (b) 1. Draw Molecular Architectures For Linear, Branched, **07**
 Crosslinked And Dendritic Conformations
 2. Define : Isomerism ; Mesogens ; Rayleigh ratio.
- Q.2** (a) Discuss Boltzmann's superposition Principle **07**
 (b) Discuss Gel permeation chromatography. **07**
- OR**
- (b) What is Chain length and contour length? Calculate the chain length and **07**
 contour length of a PE molecule whose C-C chain is $1.54 \text{ \AA}$ and bond
 angle is $109^\circ 28'$. Assume $n=20000$.
- Q.3** (a) What is intrinsic viscosity ? Discuss Mark Houwink equation and its significance **07**
 (b) Discuss Maxwell's model **07**
- OR**
- Q.3** (a) Discuss Size Exclusion Chromatography **07**
 (b) 1. Discuss Theta Temperature **07**
 2. Discuss Radius of gyration.
- Q.4** (a) Discuss polymer dissolution. **07**
 (b) Discuss Gaussian distribution **07**
- OR**
- Q.4** (a) Discuss Stereo and Structural Isomerism. **07**
Q.4 (b) What is Flory Huggins theory. Discuss. **07**
- Q.5** (a) What is Gradient elution Technique? **07**
 (b) What is Polymer Configuration and Polymer conformation? Suppose we **07**
 want to develop a polymer blend, do we affect the polymer configuration
 or conformation. Discuss with examples.
- OR**
- Q.5** (a) Discuss difference between amorphous and crystalline polymers. **07**
 (b) What is mean end to end distance? Consider an ideal polyethylene chain **07**
 with molar mass $M=10^5 \text{ g/mol}$; where $a=6$. Its mean end to end distance
 is given by $\langle R^2 \rangle = Cb^2N$, 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 $M_{\text{mon}} = 28 \text{ g/mol}$.
