Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-Vth Examination December 2010

Subject code: 152302 **Subject Name: Physics of Plastics**

Date: 15 /12 /2010 **Time: 03.00 pm - 05.30 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)**	Draw molecular architectures for linear, branched, crosslinked and dendritic conformations.	**07**
	(b)	Explain the Flory Huggins Lattice theory.	**07**
Q.2	**(a)**	Discuss Gel Permeation chromatography	**07**
	(b)	Explain the free volume theory of Tg.	**07**
		OR	
	(b)	Discuss factors affecting crystallinity.	**07**
Q.3	**(a)**	What is Avogadro's number? If a PE molecule has 2000 nos.of monomers , each with a molar mass of 28 g/mol, calculate the weight of each molecule?	**07**
	(b)	Define [any seven] : polymer Melts; Polymer solutions; Mesogens; Nematic phase; Rayleigh ratio; Intrinsic viscosity ; Crystallites; crystallizability; spherulites	**07**
		OR	
Q.3	**(a)**	Discuss the Boltzmann's superposition Principle	**07**
	(b)	Discuss about electronic polymers	**07**
Q.4	**(a)**	Discuss RANDOM WALK Probability	**07**
	(b)	Consider a polystyrene solution with a concentration c=1 g/L in a solvent with a density , ρ=0.9 g/cm^3. Estimate the volume of a polystyrene monomer in this solution if the density of bulk polystyrene is ρ= 1 g/cm^3 and the mass of the monomer is M_{mon} = 104 g/mol. What is the volume fraction of polystyrene in this solution?	**07**
		OR	
Q.4	**(a)**	What is structural and stereo isomerism? Explain with examples	**07**
	(b)	Discuss Size Exclusion Chromatography	**07**
Q.5	**(a)**	Discuss Mark Houwink equation and its significance	**07**
	(b)	Consider a blend obtained by mixing 1g of a polymer woth a molar mass M_A= 1 x 10 g/mol. And 2 g of the same type of polymer with a molar mass M_B = 2 x 10 g/mol.	**07**
		(i) Calculate the number – average molar mass M_n of this blend.	
		(ii) What is the weight-average molar mass M_w of this blend?	
		(iii) What is the polydispersity index of this polymer blend?	
		OR	
Q.5	**(a)**	1. Discuss Fox- flory equation and its significance.	**07**
		2. Discuss polymer configuration v/s. polymer conformation	
	(b)	Explain the effects of chemical structure on Tg	**07**

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