Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER V • EXAMINATION – WINTER - 2012

Subject code: 152302 Date: 12-01-2013

Subject Name: Physics of Plastics

Time: 02:30 pm to 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. 2. Differentiate between Amorphous v/s. Crystalline polymers.	**07**
		OR	
	(b)	The intrinsic viscosity of a solution of polyisobutylene at 20 ˚C is 180 cm^3g^{-1}. If [η] is related to the viscosity average molecular weight Mv by the expression , $[\eta]= 3.60 \times 10^{-4}(Mv^{0.64})$, calculate the molecular weight Mv of the polymer.	**07**
Q.3	**(a)**	[i] What is Chain length and contour length? Calculate the chain length andcontour length of a PE molecule whose –C-C- chain is 1.54A° and bondangle is 109° 28'. Assume n=1000 [ii] The intrinsic viscosity of polymer sample is 217 cm^3g^{-1}. calculate the approximate concentration of sample , which would have relative viscosity of 1.5	**07**
	(b)	List various mechanical models of visco-elastic fluids. Explain Maxwell Model in detail.	**07**
		OR	
Q.3	**(a)**	What is the principle of a rotational viscometer? Explain Brookfield viscometer in detail.	**07**
	(b)	Discuss the Boltzmann's superposition Principle	**07**
Q.4	**(a)**	What are the factors affecting Tg? Discuss	**07**
	(b)	Define [any seven] : Crystallites ;Spherulites ; Rayleigh ratio ;Mesogens'; Polymer fractionation ; Viscoelasticity; Entropy; polymer Melts; Polymer solutions; Nematic phase; Intrinsic viscosity	**07**
		OR	
Q.4	**(a)**	What is the difference between dissolution of low molecular weight compounds and polymers in a solvent. Discuss in detail	**07**
Q.4	**(b)**	What is intrinsic viscosity ? Discuss Mark Houwink equation and its significance	**07**
Q.5	**(a)**	Discuss factors affecting crystallinity.	**07**
	(b)	[i] Discuss RANDOM WALK Probability [ii] Discuss Radius of gyration	**07**
		OR	
Q.5	**(a)**	Give classification of non-Newtonian fluids and explain in detail with example.	**07**
	(b)	What is Avogadro's number? If a PE molecule has 3000 nos.Of monomers, each with a molar mass of 28 g/mol, calculate theweight of each molecule?	**07**

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