BT – PS&E – V – 11.14 – 1032 Reg. No. | | | | | | | | |

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B. Tech. Degree V Semester Examination in Polymer Science and Engineering November 2014

PE 1502 POLYMER PHYSICS

Time: 3 Hours Maximum Marks: 50

PART A

(Answer *ALL* questions)

(10 x 2 = 20)

I. (a) Distinguish polymer configuration from conformation.
(b) Why are polymers generally not fully crystalline?
(c) How are thermal transitions of polymers different from those of simple compounds?
(d) Distinguish true stress from engineering stress and true strain from engineering strain.
(e) Why do polymers show higher strength and yield stress in compression than in tension?
(f) Explain the relationship between variation of temperature and variation of strain rate in the stress-strain behaviour of a polymer.
(g) What is the reason for the low fracture strength compared to the theoretical value as per fracture mechanics?
(h) Why is surface resistivity of polymers usually different from their volume resistivity?
(i) What is the major drawback of the randomly occupied lattice model of a polymer solution in the Flory-Huggins theory?
(j) How is determination of electric strength similar to the determination of tensile strength?

PART B

(4 x 7½ = 30)

II. (a) Which are the factors that decide the tendency of a polymer to crystallize? (4½)
(b) Explain three important factors. (3)

OR

III. Explain morphology of a crystalline polymer and show how it affects its properties. (7½)

IV. (a) Why is glass transition temperature a very important property for polymers? (4)
(b) Explain the free volume theory of glass transition and its application in typical cases. (3½)

OR

V. (a) Distinguish thermal conductivity from thermal diffusivity and the types of conduction in which these properties are important. (5)
(b) What is the significance of thermal diffusivity in polymer processing? (2½)

(P.T.O.)

VI.	(a)	Define solubility parameter. What is its disadvantage when used for finding the solvent for a polymer?	(4½)
	(b)	How can solubility parameter be determined experimentally?	(3)
		OR	
VII.	(a)	Define relative viscosity, specific viscosity, reduced viscosity and intrinsic viscosity.	(3)
	(b)	How can intrinsic viscosity be determined experimentally? How is it related to average molecular weight?	(4½)
VIII.		Define stiffness, elasticity, resilience, strength and toughness based on stress-strain behaviour of polymers.	(7½)
		OR	
IX.	(a)	Distinguish ductile fracture from brittle fracture.	(4½)
	(b)	Explain the factors which influence the mode of failure.	(3)

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