Total Marks: 70

GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VII(NEW) • EXAMINATION – WINTER 2016

Subject Code:2173603 Date:18/11/2016 Subject Name:Evaluation & Testing of Polymers & Rubber(Department Elective - VII)

Time:10.30 AM to 1.00 PM

Instructions:

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

Q.1 (a) 07Discuss the measurement and importance of the following tests.(i) Heat distortion temperature and (ii) Melt flow index

(b)

(i) Define Impact resistance. Mention its usefulness. Also draw a typical stress-strain curve of: polystyrene, HIPS and natural rubber (4)

(ii) Name the characterization technique to determine the following polymer properties: crystallinity & crystal size, meting temperature, glass transition temperature, ash content, damping factor, viscosity (3)

Q.2 (a) Define the following:

Elongation-at-break, Strain, Ultimate tensile strength, Yield Strength, Proportional Limit, Modulus of Elasticity, Toughness

(b)

(i) Define : storage modulus, loss modulus and tan δ (3) (ii) Two miscible polymers A (T_g= -30 °C) and B (T_g= 50 °C) are blended in weight ratio 30:70, then the T_g of the blend is? (4)

OR

(b) Answer the following terms: Lambert Beer's Law, Hooke's Law (IR), Nitrogen rule, 07 Tetramethyl silane, Bragg's Equation, Source of X-ray, Mark Houwink Equation

Q.3 (a) Write down the major analysis which can be carried out in polymer system from following test: FTIR, NMR, MS, UV, XRD, GPC, TGA

(b) What information do you get from DSC? Draw a typical DSC trace of PET and mark 07 the transitions. How can you calculate % crystallinity from DSC?

OR

Q.3 (a) Answer the following terms: Creep, Fatigue, Stress cracking, Flexural strength, Wear, 07
 Viscoelastic, toxicity

07

07

07

	(b) What information do you get from thermogravimetric analyzer? Give its significances. How can you compare the thermal stability of different polymers (PVC, nylon PTEE & PE)?	07
Q.4	(a) How is Hardness of polymer/rubber determined? Mention its uses and usefulness in product design	07
	(b) What information do you get from following test? Mention their usefulness in product design: DSC, Izod and Charpy test	07
Q.4	OR (a) What information do you get from following test; explain it by selecting any polymer? Mention their usefulness: DMA and UTM	07
	(b) Write short note: (i) Weathering resistance (ii) Gloss	07
Q.5	 (a) (i) A polymer solution is made by dissolving 5 g of polymer in 1000 ml of solvent. The flow time of the solvent and that of polymer solution between two appropriate marks in viscometer are 40 s and 60 s, respectively. Calculate the reduced viscosity (in dLg⁻¹) of polymer solution. (3) 	07
	(ii) Describe the method for determination of viscosity average molecular weight of polymers. (4)	
	(b) Write short note on: (i) Capillary rheometer (ii) Parallel plate flow	07
Q.5	OR (a) What is called 'Limiting oxygen index'? How is it useful to predict flammability characteristics of plastics?	07
	(b) Write short note on: (i) Brookfield rheometer (ii) Cone and plate flow	07
