



GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2170103/2170107

Date: 10/11/2017

Subject Name: Mechanics of Composite Materials

Time: 10:30 AM TO 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.

		MARKS
Q.1	(a) What is composite material? Classify Constituent materials.	03
	(b) What is FRP? Write characteristics and advantages of FRPs.	04
	(c) Discuss in details anti symmetric laminates.	07
Q.2	(a) Explain Carbon fibres.	03
	(b) The E-glass fibre in a polyester resin is 35% by weight. Given $\rho_f = 2.50$ gm/ml and $\rho_m = 1$ gm/ml. Calculate V_f and ρ_c for the lamina.	04
	(c) Explain the importance of composite materials in today's world. Also mention the disadvantages and advantages as compared to other materials.	07
	OR	
	(c) Explain A, B and D matrices in detail with proper derivation.	07
Q.3	(a) What are the advantages of fibres over other composite materials?	03
	(b) Write a note on Poisson's ratio.	04
	(c) Derive equations for volume and weight fractions.	07
	OR	
Q.3	(a) Write a note on Polymeric Matrix.	03
	(b) Explain the stress strain relationship of a specially orthotropic material and Transversely Isotropic material.	04
	(c) A high strength composite has the following elastic constants. $E_1 = 145$ GPa, $E_2 = 12$ GPa, $E_3 = 6$ GPa, $\nu_{12} = 0.25$. Determine the transformed reduced stiffness matrix for the lamina with ply angle $\theta = 45^\circ$.	07
Q.4	(a) What is the need of Composite materials in the field of Aviation? Explain in brief.	03
	(b) List down the basic assumptions made for laminate.	04
	(c) For isotropic materials explain transformation of stress and strain in detail with necessary derivation.	07
	OR	
Q.4	(a) Name the methods to find properties of FRCs on the basis of its constituent elements.	03
	(b) Compare Polyester resins with Epoxy resins.	04
	(c) Write a note on applications of composite materials.	07
Q.5	(a) Write a note on Aramid fibres.	03
	(b) Write a note on Equilibrium equations.	04
	(c) Discuss in detail symmetric laminates.	07
	OR	
Q.5	(a) What is the need of Fillers? Explain in details.	03
	(b) Classify the types of laminate configuration.	04
	(c) Compute $[A]$ matrix for a $[0/\pm 45]$ laminate with the following laminate properties. $E_1 = 145$ GPa, $E_2 = 10.5$ GPa, $E_3 = 7.5$ GPa, $\nu_{12} = 0.28$ Thickness of each lamina is 0.25 mm.	07

