Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160112 Date:06/06/2022

Subject Name: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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is a composite material?	**03**
	(b)	Explain particulate and fiber reinforced composite materials.	**04**
	(c)	Derive longitudinal strength and stiffness for unidirectional lamina.	**07**
Q.2	**(a)**	What is prepegs?	**03**
	(b)	Differentiate between lamina and laminate.	**04**
	(c)	Derive transverse modulus for unidirectional lamina.	**07**
		OR	
	(c)	Derive inplane shear modulus for unidirectional lamina.	**07**
Q.3	**(a)**	What is the need of Fillers? Explain in details.	**03**
	(b)	Write a note on Equilibrium equations.	**04**
	(c)	Explain different types of fibers.	**07**
		OR	
Q.3	**(a)**	How many number of independent elastic constants for monoclinic material?	**03**
	(b)	What is transformation of stress and strain?	**04**
	(c)	Explain different types of thermoset polymers.	**07**
Q.4	**(a)**	How many number of independent elastic constants for general anisotropic material?	**03**
	(b)	A glass /epoxy specimen weighing 0.98 gm was burnt and the weight of the remaining fibers was found to be 0.49 gm. Densities of glass and epoxy are 2.4 gm/ml and 1.2 gm/ml respectively. Determine the density of composites in the absence of voids.	**04**
	(c)	What is the application of Composite materials in the field of Aviation?	**07**
		OR	
Q.4	**(a)**	Write a note on Poisson's ratio with reference of composite material.	**03**
	(b)	Explain the stress strain relationship of a specially orthotropic material and Transversely Isotropic material.	**04**
	(c)	Discuss in details anti symmetric laminates.	**07**
Q.5	**(a)**	Explain stress-strain relation of an Isotropic Material.	**03**
	(b)	The E-glass fibers in a polyster 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)	Describe the behavior of Young's modulus Ex, Ey and Shear modulus Es with orientation angle.	**07**
		OR	
Q.5	**(a)**	Explain stress-strain relation of an Orthographic Material.	**03**
	(b)	What are the basic assumption for analysis of laminated composites?	**04**
	(c)	Derive Strain-Displacement relationship of a laminate along with a neat sketch stating all the necessary assumptions.	**07**

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