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 Vf and ρc 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, $E_6 = 6$ GPa, $v_{12} = 0.25$. 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 id 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 [0I±45] laminate with the following laminate properties. $E_1 = 145$GPa, $E_2 = 10.5$ GPa, $E_6 = 7.5$GPa, $v_{12} = 0.28$ Thickness of each lamina is 0.25 mm.	**07**

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