Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 170103 **Date: 01/01/2013**

Subject Name: Mechanics of Composite Materials

Time: 10.30 am - 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Describe classification of composite materials. Explain in detail various types with suitable examples	**07**
	(b)	Describe and explain the strength and stiffness of composite materials and metals. Show the comparison also.	**07**
Q.2	**(a)**	Define and explain a lamina and laminate with sketches	**07**
	(b)	Explain in detail and with sketches the mechanical behavior of isotropic, orthotropic and anisotropic materials. **OR**	**07**
	(b)	Describe and cite the applications of composites and their use in different industries	**07**
Q.3	**(a)**	Describe micromechanical behavior of a composite lamina in detail	**07**
	(b)	Describe anisotropic, monoclinic, orthotropic and transversely isotropic materials	**07**
		OR	
Q.3	**(a)**	Describe the stress strain relations for plane stress in an orthotropic material	**07**
	(b)	Describe the macro mechanical behavior of a composite lamina in detail	**07**
Q.4	**(a)**	Explain in detail symmetric laminates with two example	**07**
	(b)	Write a short note on unsymmetric and anti-symmetric laminates with two example	**07**
		OR	
Q.4	**(a)**	Derive transformation of stress-strain relations for a lamina with arbitrary orientation	**07**
Q.4	**(b)**	Describe [A], [B] and [D] matrices and explain its importance	**07**
Q.5	**(a)**	A two ply aluminum and steel plate having a thickness of 1 inch is stacked together $E_{aluminum}= 10*10^6$ psi, $\nu = 0.33$ and $E_{steel}= 29*10^6$ psi, $\nu = 0.28$. Find [A], [B] and [D] matrices	**07**
	(b)	Derive inplane-shear modulus and Poisson's ratio for a uni-directional composite	**07**
		OR	
Q.5	**(a)**	Derive transverse modulus for a uni-directional composite	**07**
	(b)	For a two ply Boron epoxy laminate of $0^0_{(0.1\ inch)}/45^0_{(0.2\ inch)}$ find out the [A] matrix	**07**

Given: $[Q] = \begin{matrix} 30 & 1 & 0 \\ 1 & 3 & 0 \\ 0 & 0 & 1 \end{matrix} * 10^6$ psi

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