Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- VIIth SEMESTER–EXAMINATION – MAY/JUNE- 2012

Subject code: 170103 **Date: 09/06/2012**

Subject Name: Mechanics of Composite Materials

Time: 02:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

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

Q.1 **(a)** Define composite material and classified composite material with their specific application. **07**

(b) What do you understand by mechanical behavior of composite materials? **07**

Q.2 **(a)** Discuss stress-strain relation of a thin lamina. **07**

(b) Distinguish between matrix and dispersed phase in a composite material. Justify - glass fiber are most commonly used for reinforcement. **07**

OR

(b) Describe following terms with sketch. **07**

(i) Metal Matrix Composite (MMC)
(ii) Whiskars
(iii) Aligned discontinues fiber reinforced.
(iv) Laminate.
(v) Particle reinforced.

Q.3 **(a)** Explain methodology for how to determine stresses and strain of lamina. **07**

(b) What are the properties of composite materials? How they help for selection of composite material. **07**

OR

Q.3 **(a)** Explain micromechanics of failure of unidirectional lamina with sketch. **07**

(b) Calculate the volume ratio of aluminium and boron composite which have the Young's modulus equal to that of iron. The Young's modulus of Al, iron and boron are 71, 210 and 440 GN/m^2 respectively. **07**

Q.4 **(a)** Derive equilibrium equation for laminated composite. **07**

(b) Explain transverse modulus and in-plane shear modulus. **07**

OR

Q.4 **(a)** Give classification of different type of laminate configuration. Explain balanced laminate and anti symmetric laminate. **07**

(b) Describe the significance of [A], [B] and [D] matrices and explain with suitable example how all plies of a given composite material are accounted for in these matrices. **07**

Q.5 **(a)** What is the role of shear strength and anisotropic strength in failure of composite material? **07**

(b) What is hybrid composite? Give important advantage of hybrid composite over normal composite. **07**

OR

Q.5 **(a)** Discuss elastic properties of unidirectional laminate and explain its engineering constants. **07**

(b) A unidirectional lamina is subjected to stress as follows $\sigma_1 =$ 350 MPa $\sigma_2 = 70$ MPa and $\sigma_6 = 20$ MPa, E = 100 kN/mm^2 v = 0.25 . Determine reduced stiffness, reduced compliance matrix and the strain composites. **07**

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