Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3160112 Date:28-11-2024

Subject Name:Composite Materials

Time:02:30 PM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	What is a composite material?	**03**
	(b)	How do composite materials differ from traditional materials like metals or plastics?	**04**
	(c)	1. What are the primary components of a composite material? 2. What is the matrix phase in composite materials?	**07**
Q.2	**(a)**	What are the advantages of using composite materials over metals?	**03**
	(b)	What is a laminate composite**?**	**04**
	(c)	1. What is fiber-matrix debonding, and how can it be prevented? 2. What are nano-composites, and how do they differ from conventional composites?	**07**
		OR	
	(c)	1. How are glass-fiber-reinforced composites (GFRP) different from carbon-fiber composites? 2. What is pultrusion, and how is it used in manufacturing composite materials?	**07**
Q.3	**(a)**	What are the principal material axes in a unidirectional lamina?	**03**
	(b)	What is Balanced Laminates?	**04**
	(c)	Write a note on Strain-Displacement Relationship.	**07**
		OR	
Q.3	**(a)**	How does fiber orientation affect the elastic properties of a unidirectional lamina?	**03**
	(b)	What is Symmetric Laminates?	**04**
	(c)	Write a note on Stress-Strain Relationships.	**07**
Q.4	**(a)**	How do fiber and matrix properties influence the overall elastic behavior of a unidirectional lamina?	**03**
	(b)	What are the primary objectives of micromechanical analysis in composites?	**04**
	(c)	What is the importance of boundary conditions in micromechanical models for composites? Explain.	**07**
		OR	
Q.4	**(a)**	How do micromechanical models handle multiphase composites, including both fiber and matrix interactions?	**03**
	(b)	What role does fiber-matrix interface strength play in determining the overall strength of a composite?	**04**

	(c)	How is failure initiation predicted in composites using micromechanical analysis?	**07**
Q.5	**(a)**	What is FRP?	**03**
	(b)	Combinations of Composite materials justify the statement.	**04**
	(c)	How does Cox's model help in predicting the stiffness of composites with aligned fibers? Explain	**07**

OR

Q.5	**(a)**	What is the Mechanical Behavior of Composite Materials?	**03**
	(b)	Write an Applications of Composite material in Aerospace Industry.	**04**
	(c)	Write a note on Fibers and Resins.	**07**

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