Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3160112   **Date:15-12-2022**
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)**	Why are Composites used in Aerospace?	**03**
	(b)	Define a composite material and give its classification in detail.	**04**
	(c)	Write short notes.	**07**
		1) Types of fiber.	
		2) Types of matrix.	
Q.2	**(a)**	What are the most widely used metal material for aircraft construction?	**03**
	(b)	Discuss the various applications of composite materials.	**04**
	(c)	Derive Longitudinal Strength and stiffness for composite ?	**07**

<div align="center">OR</div>

	(c)	Derive Volume and Weight fraction for composite ?	**07**
Q.3	**(a)**	Define: Fiber and Resins.	**03**
	(b)	What are advantages of carbon fiber in Aerospace?	**04**
	(c)	The E-glass fibers in polyester is 35% by weight. Given Density of fiber $\dot\rho f$=2.50gm/ml and density of matrix $\dot\rho m$=1 gm/ml Calculate fiber volume fraction Vf and density of composite $\dot\rho c$ for the lamina.	**07**

<div align="center">OR</div>

Q.3	**(a)**	Define Lamina and laminate.	**03**
	(b)	What is FRP? Write characteristics and advantages of FRPs.	**04**
	(c)	Describe the stress-strain relations for plane stress in an orthotropic material.	**07**
Q.4	**(a)**	Define Isotropic and Anisotropic body.	**03**
	(b)	What is Prepeg? Explain.	**04**
	(c)	Identify of laminate.	**07**
		1. [90|0]	
		2. [45|0|-45]	
		3. ['±30]	
		4. [0|90|0|90]	
		5. [60|02|60]	
		6. [20|45|-20|-45]	
		7. [0|90]S	

<div align="center">OR</div>

Q.4	**(a)**	What are the characteristics of super alloys?	**03**
	(b)	Discuss in detail symmetric laminates.	**04**
	(c)	Write note on Poisson's ratio and its Mismatch effect.	**07**

Q.5	**(a)**	What is the need of Fillers? Explain in details.	**03**
	(b)	Compare Polyester resins with Epoxy resins.	**04**
	(c)	A unidirectional fiber reinforced composite contains 55 % by volume of fibers. Evaluate the longitudinal tensile modulus and strength of this FRC.	**07**

Given $E1f=300GPa$, $\sigma1f=5.6GPa$, $Em=3.5GPa$, $\sigma m=100MPa$.

OR

Q.5	**(a)**	Compare Polyester resins with Epoxy resins.	**03**
	(b)	Write in detail classification of laminates.	**04**
	(c)	Derive Inplane Shear modulus with neat sketch.	**07**

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