Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2170107 **Date:25/01/2021**

Subject Name:Mechanics of Composite Materials

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

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

			MARKS
Q.1	**(a)**	Define the term Composite Material and its various types.	**03**
	(b)	Explain Carbon fibers.	**04**
	(c)	Explain in detail advantage and disadvantage of composite material.	**07**
Q.2	**(a)**	What is the role of Reinforcement and Matrix in composite material?	**03**
	(b)	Describe the basic assumption of the analysis of laminated composite.	**04**
	(c)	Discuss in details anti symmetric laminates.	**07**
Q.3	**(a)**	What is the total no. of independent elastic constant of General anisotropic material, Monoclinic material and Isotropic material? [Only Value]	**03**
	(b)	Describe the following terms with the sketch.(Any two) 1. Metal Matrix Composite (MMC) 2. Laminate. 3. Particle reinforced.	**04**
	(c)	Derive equations for volume and weight fractions	**07**
Q4.	**(a)**	For an orthotropic lamina, engineering constant along he principal material axes are E1=150 Gpa, E2=20 Gpa, G12 = 5 Gpa, v12=0.2.	**03**
	(b)	What do you understand by the mechanical behavior of composite materials?	**04**
	(c)	Derive equations for longitudinal strength and stiffness.	**07**
Q.5	**(a)**	What is the need of Fillers? Explain in details	**03**
	(b)	Write a short note on Poisson's Mismatch effect.	**04**
	(c)	Derive the equation for the stress - strain relationship in composite laminate with equilibrium equation.	**07**
Q.6	**(a)**	Explain about prepegs.	**03**
	(b)	Describe the Relation between stiffness coefficient Cij and compliance component Sij.	**04**
	(c)	Identify the type of laminate given below: 1. [90|0] 2. [45|0|-45] 3. ['±30] 4. [0|90|0|90] 5. [20|45|-20|-45]	**07**

Q.7	**(a)**	Name the methods to find properties of FRCs on the basis of its constituent elements.	**03**
	(b)	Write down the significance of fillers and additives in composite materials in detail.	**04**
	(c)	Derive In-Plane Sher modulus and transverse ratio.	**07**
Q.8	**(a)**	Write a note on Aramid fibers.	**03**
	(b)	The E-glass fiber in a polyester resin is 35% by weight. Given ρf = 2.50 gm/ml and ρm = 1 gm/ml. Calculate Vf and ρc for the lamina.	**04**
	(c)	Describe the stress-Strain relation of a monoclinic material.	**07**

****