U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

August 2024 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Aerospace Engineering **Duration: 3 hrs.**
Course Code: 20AE6DCCMT **Max Marks: 100**
Course: Composite Materials

Instructions:

1. Draw figures wherever necessary.
2. Assume suitable data wherever necessary.

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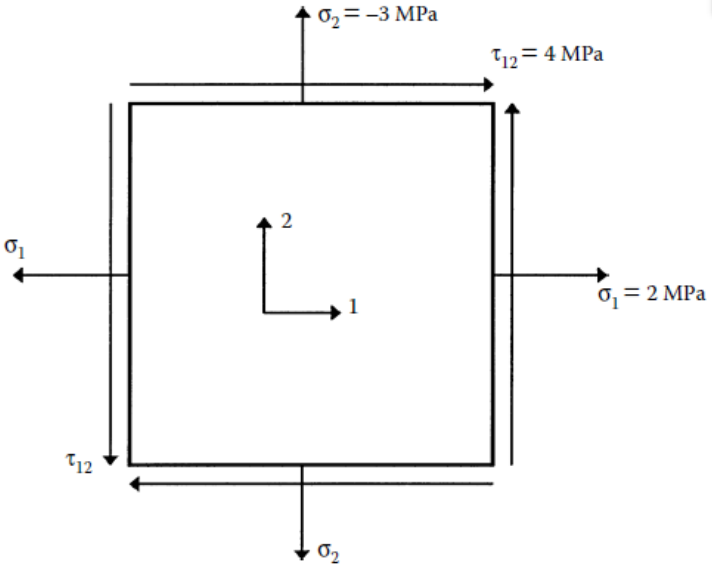
Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Define a composite material; Brief about the complete classification of composite materials.	CO1	PO1	5
	b)	Write a short note on i) Fiber ii) Particulate iii) whiskers iv) sandwich v) Flakes	CO1	PO1	5
	c)	Explain the application of composites in covering different fields of applications.	CO1	PO1	10
		OR			
2	a)	Explain pultrusion process with a neat sketch. Mention its applications.	CO1	PO1	10
	b)	Explain hand layup and spray layup of polymer matrix composites	CO1	PO1	10
		UNIT - II			
3	a)	Write down the elements of reduced stiffness matrix of a uni-directional lamina stating the assumptions in evolving this matrix. Derive an expressions for the reduced stiffness coefficients in terms of Elastic constants of the lamina.	CO2	PO1 PO2	10
	b)	Determine the modulus of elasticity of a FRP on fiber direction (E_1) and in the transverse direction (E_2), with proper representative sketches.	CO2	PO1 PO2	10
		OR			
4	a)	Determine the equation of major poison's ratio and the equation of Shear Modulus of a unidirectional lamina, with proper representative sketches.	CO2	PO1 PO2	12

		b)	For a graphite/epoxy unidirectional lamina, find the following, find 1. Compliance matrix 2. Reduced stiffness matrix if the applied stresses (in Figure 4b) are σ_1 = 2 MPa, σ_2 =3 MPa, τ_{12} =4 MPa. E_1 = 181 GPa, E_2 = 10.3 GPa, ν_{12} = 0.28 and G_{12} = 7.17 GPa  Figure:4b	*CO2*	*PO1* *PO2*	**08**
			UNIT - III			
	5	a)	Write down the elements of reduced compliance matrix of 2D orthotropic angular lamina stating the assumptions in evolving this matrix. Derive expressions for the reduced compliance coefficients in terms of engineering constants.	*CO3*	*PO1* *PO2*	**12**
		b)	Determine the equations for the elements of the transformed reduced stiffness matrix for a Two-Dimensional Angle.	*CO3*	*PO1* *PO2*	**08**
			UNIT - IV			
	6	a)	Explain in detail on non-Interactive failure criteria and its types	*CO4*	*PO1* *PO2*	**5**
		b)	State and explain Tsai-Hill theory of a lamina	*CO4*	*PO1* *PO2*	**10**
		c)	State and explain Tsai- Wu theory of a lamina	*CO4*	*PO1* *PO2*	**5**
			UNIT - V			
	7	a)	Derive an expression for the three stiffness matrices [A], [B] and [D] for a 2D laminate composite	*CO5*	*PO1* *PO2*	**12**
		b)	Write the assumptions of Classical lamination theory (CLT) and derive the stress-strain relations for a classical laminate and represent the stress-strain variation in a laminate.	*CO5*	*PO1* *PO2*	**08**

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