CBCS SCHEME

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BAE601

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Composite Materials and Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Describe the classification of composite materials in detail.	10	L1	CO1
	b.	Derive the stress-strain relation for Anisotropic materials and show it has 21 elastic constants in stiffness matrix.	10	L3	CO1
		OR			
Q.2	a.	Derive the expressions for orthotropic materials and show it has a elastic constants in stiffness matrix.	10	L3	CO1
	b.	Find the compliance and stiffness matrix for a graphite/epoxy lamina. The material properties are given as : $E_1 = 181$ GPa ; $E_2 = 10.3$ GPa ; $E_3 = 10.3$ GPa $\gamma_{12} = 0.28$; $\gamma_{23} = 0.60$; $\gamma_{13} = 0.27$ $G_{12} = 7.17$ GPa ; $G_{23} = 3$ GPa ; $G_{31} = 7$ GPa.	10	L3	CO1
		Module – 2			
Q.3	a.	Find the major Poisson's Ratio and In-plane shear modulus using mechanics of materials approach.	10	L3	CO2
	b.	Using Elasticity approach, find the transverse Young's modulus for composites.	10	L3	CO2
		OR			
Q.4	a.	Derive the Hooke's law for a two-dimension uni-directions lamina using plane stress assumption. Also write stiffness compliance matrix.	10	L2	CO2
	b.	For a Graphite/epoxy unidirectional lamina, Find the following : i) Compliance matrix ii) Minor Poisson's ratio iii) Reduced stiffness matrix Take : $E_1 = 181$ GPa ; $E_2 = 10.3$ GPa ; $\gamma_{12} = 0.28$, $G_{12} = 7.17$ GPa.	10	L3	CO2
		Module – 3			
Q.5	a.	Derive the classical plate theory and find the strain – Displacement relations.	10	L3	CO3
	b.	Explain with the necessary expressions, the Tsai-Wu Failure Theory.	10	L2	CO2
		OR			
Q.6	a.	Using Classical plate theory, find [A], [B] and [D] metrics for a laminate.	10	L3	CO3
	b.	Explain the Tsai-Hill Failure Theory using necessary expressions.	10	L2	CO3

		Module – 4			
Q.7	a.	With neat sketch, explain the structure Sandwich Panel and write its advantages and disadvantages.	10	L1	CO4
	b.	Derive the Flexural rigidity for sandwich panel with different face thickness and materials.	10	L3	CO4
		OR			
Q.8	a.	Write the failure modes of sandwich panel and explain.	10	L1	CO4
	b.	Explain the Testing methods used for the sandwich panels.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain the Vaccum Beg molding process with neat sketch.	10	L1	CO5
	b.	Explain the Filament winding process with neat sketch.	10	L2	CO5
		OR			
Q.10	a.	Explain the Injection molding process with neat sketch.	10	L2	CO5
	b.	Explain about the Joining process of composites in the post-processing.	10	L2	CO5

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