Code No: **RT41215** **R13** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, February/March - 2018

ANALYSIS OF COMPOSITE STRUCTURE

(Aeronautical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1.	a)	What are the limitations of composite materials?	[3]
	b)	What is meant by orthogonally isotropic material? Give an example.	[4]
	c)	Distinguish between micro and macro mechanics approach?	[4]
	d)	Explain what is a cross ply, symmetric and angle ply laminates?	[3]
	e)	What are the assumptions used in classical laminate theory?	[4]
	f)	Write the importance of failure envelopes in structural analysis?	[4]

PART–B *(3x16 = 48 Marks)*

2.	a)	What are the advantages of composite materials? And explain its area of applications?	[8]
	b)	Enumerate the classification of composites citing one example in each category	[8]
3.	a)	Describe stress strain relations for a lamina of arbitrary orientation?	[8]
	b)	Using the mechanics of materials approach, derive the rule of mixture, stating the assumptions made?	[8]
4.		How to determine the Young's modulus in longitudinal and transverse directions for a lamina using mechanics of material approach?	[16]
5.	a)	Find the compliance 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, ν_{12} = 0.28, ν_{23} = 0.60, ν_{13} = 0.27, G_{12} = 7.17 GPa, G_{23} = 3.0 GPa and G_{31} = 7.00 GPa.	[12]
	b)	What are the main factors that are peculiar to laminate strength analysis?	[4]
6.	a)	Derive the expression for stiffness matrix and compliance matrix for an angle ply lamina using generalized Hooke's law.	[8]
	b)	Compute all terms of [A] [B] and [D] matrices for [+45/-45] lamina with the following lamina properties. E1=140 GPa, E2=10GPa, E6=5 GPa and ν12 is 0.3. Take ply thickness d=0.125 mm.	[8]
7.		Briefly discuss the theory and relevant buckling equations for laminated plates.	[16]