E **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 95P29

Ph.D COURSE WORK EXAMINATION, NOV 2019

Elective

CAD / CAM

19PCD529 - Composite Materials and Mechanics

(Regulation 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1.	(a)	Explain monoclinic material with compliance and stiffness matrices.	CO1-U	(20)
		Or		
	(b)	Show the reduction of anisotropic material stress-strain equations to those of a monoclinic material stress-strain equations.	CO1-U	(20)
2.	(a)	Find the following for a 60º angle lamina of graphite /epoxy. E1=181GPa, E2=10.3GPa, υ12=0.28,G12=7.17GPa. (a) Transformed compliance matrix (b) Transformed reduced stiffness matrix If the applied stress is σx =2 MPa, σy =-3MPa, τxy = 4MPa, also find (c) Global strains (d) Local strains (e) Local stresses 20 (f) Principal stresses (g) Maximum shear stress (h) Principal strains	CO2- App	(20)
		Or		
	(b)	For glass epoxy laminate Ef = 85 Gpa, Em = 3.4 GPa, υm = 0.3 and υf = 0.25, find the minor Poisson's ratio υ21 and G12 for a fiber volume fraction of 70	CO2- App	(20)
3.	(a)	Explain Tsai-Hill failure theory used for anisotropic materials. Show that for unidirectional lamina the failure theory can be written as σ1 2 / X2 - σ1σ2 / X2 + σ2 2 / Y2 + τ12 2 / S2 = 1 where σ1, σ2, τ12 are the stress components with respect to principal material direction and X, Y and Z are failure strengths of the lamina.	CO3-Ana	(20)

Or

	(b)	Find the stiffness matrices [A], [B] for a three ply [0/30/-45] graphite epoxy laminate. Assume each lamina has a thickness of 5mm. The properties of graphite/epoxy El =181 GPa, Et =10.3 GPa, υlt = 0.28 and Glt =7.17 GPa.	CO3-Ana	(20)
4.	(a)	Explain basic design concept of sandwich construction.	CO4-U	(20)
		Or		
	(b)	Obtain an expression for the flexural modulus of a Sandwich plate with different face thickness. Sandwich plate with different face thickness and material	CO4-U	(20)
5.	(a)	Write short notes on vacuum bag moulding and continuous pultrusion.	CO5-U	(20)
		Or		
	(b)	Explain the applications of resins.	CO5-U	(20)