Reg. No. : | | | | | | | | | | |

Question Paper Code: 52915

M.E. DEGREE EXAMINATION, DECEMBER 2015

Elective

CAD / CAM

15PCD525 – COMPOSITE MATERIALS AND MECHANICS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(5 x 20 = 100 Marks)

1. (a) Classify the composite materials based on

   (i) Matrix materials. (10)

   (ii) Reinforcement materials and explain them briefly. (10)

Or

   (b) Explain the properties of

   (i) Long fiber composites and Short fiber composites (10)

   (ii) Briefly explain about bonding techniques of composites. (10)

2. (a) (i) Calculate the longitudinal modulus and tensile strength of a UD composite containing 60% by volume of carbon fibers (E_f = 294 *GPa* and σ_f = 5.6 *GPa*) in an epoxy matrix (E_m = 3.6 *GPa* and σ_m= 105 *MPa*). What fraction of the load is carried by fibers in the composite? (10)

   (ii) An isotropic lamina has E = 100 kN/mm^2 and v = 0.25. Determine the reduced stiffness matrix. (6)

   (iii) Write short notes on anisotropic materials. (4)

Or

(b) (i) Derive the expression to get transformation matrix of rotation for stress and strain relation. (14)

(ii) Briefly explain about residual stresses. (6)

3. (a) (i) Derive the expression for finding the stress strain relation for angle ply laminates. (12)

(ii) Write short notes on inter laminar stresses. (8)

Or

(b) (i) What are the assumptions to be made during analysis of laminated composites? (8)

(ii) Compute all terms of the [A], [B] and [D] matrices for [0/60] laminate with the lamina properties. (12)

4. (a) (i) Explain Maximum stress theory and Maximum strain failure theory. (12)

(ii) Write short notes on netting analysis. (8)

Or

(b) (i) Write short notes on sandwich construction. (6)

(ii) Explain the measuring procedure of fracture toughness of composites with the aid of double cantilever beam experiment. (14)

5. (a) (i) Write applications and advantages of metal matrix composites. (10)

(ii) Briefly explain about composite joints. (10)

Or

(b) (i) Explain in detail about environmental risks due to the usage of synthetic fiber reinforced composites. (12)

(ii) Explain the role of ceramic matrix composites in aerospace industry. (8)