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**Question Paper Code: 52915**

M.E. DEGREE EXAMINATION, NOV 2016

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 bag moulding and hand layup process in composite development. (20)
2. (a) (i) Calculate the longitudinal modulus and tensile strength of a UD composite containing 60% by volume of carbon fibers ( $E_f = 294 \text{ GPa}$  and  $\sigma_f = 5.6 \text{ GPa}$ ) in an epoxy matrix ( $E_m = 3.6 \text{ GPa}$  and  $\sigma_m = 105 \text{ MPa}$ ). What fraction of the load is carried by fibers in the composite? (10)
- (ii) An isotropic lamina has  $E = 100 \text{ kN/mm}^2$  and  $\nu = 0.25$ . Determine the reduced stiffness matrix. (5)
- (iii) Write short notes on anisotropic materials. (5)

Or

- (b) Explain in detail about the stress-strain behavior of the composite material with suitable graph. Also infer details on rotations of stresses and residual stress on composite material. (20)

3. (a) (i) Derive the expression for finding the stress strain relation for angle ply laminates. (10)
- (ii) Write short notes on inter laminar stresses. (10)

Or

- (b) What is laminate? Derive an expression for three stiffness matrices [A], [B] and [D] for a 2<sup>D</sup> laminates composite. (20)

4. (a) (i) Explain Maximum stress theory and Maximum strain failure theory. (10)
- (ii) Write short notes on netting analysis. (10)

Or

- (b) (i) Enlist the failure criterion of the composite materials in details. (10)
- (ii) Write short notes on sandwich composite. (10)

5. (a) Explain the different clause of composite material with specified applications. (20)

Or

- (b) (i) Explain in detail about environmental risks due to the usage of synthetic fiber reinforced composites. (10)
- (ii) Explain the role of ceramic matrix composites in aerospace industry. (10)

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