CBCS SCHEME

USN | | | | | | | | | |

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Introduction to Composite Materials

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define composites and justify why the composites are better than the conventional materials.
                                                                                            (10 Marks)
   b. Discuss various fibers used in the composite manufacturing.   **(10 Marks)**

OR

2 a. Classify composites based on reinforcements, the type of matrix and natural and man-made composites.   **(10 Marks)**
   b. Explain metal matrix composites from Al, S_i, M_g and T_i with examples.   **(10 Marks)**

Module-2

3 a. With neat sketch, explain the hand layup process in composite manufacturing.   **(10 Marks)**
   b. Explain Pultrusion forming of composite manufacturing with advantages over other processes.   **(10 Marks)**

OR

4 a. Explain the vacuum bag moulding of composite manufacturing.   **(10 Marks)**
   b. Discuss the adhesives and cutting tools used for the composites.   **(10 Marks)**

Module-3

5 a. Derive the equation for elastic modulus of a composite laminate.   **(10 Marks)**
   b. Calculate the modulus of elasticity of a composite material consisting of 60% by volume of continuous E-glass fiber and 40% Epoxy resin for the matrix when stressed under iso-stress conditions. The modulus of elasticity of the E-glass is 72.4 GPa and that of the Epoxy resin is 3.1GPa.   **(10 Marks)**

OR

6 a. Define volume and mass fractions for fiber and matrix and derive expressions for the same.
                                                                                            (10 Marks)
   b. Using strength of materials approach, derive the expression for effective axial modulus and Poissons ratio.   **(10 Marks)**

Module-4

7 a. Define composite failure and discuss the modes of failure in composites.   **(10 Marks)**
   b. Explain Tsai-hill failure theory and maximum stress theory for composites.   **(10 Marks)**

OR

8 a. Explain the basic assumptions in classical laminate plate theory. (06 Marks)
  b. Derive the expression for [A], [B] matrix for laminates. (14 Marks)

Module-5

9 a. Suggest the experimental setup to test composite for tension and shear properties. (10 Marks)
  b. Discuss various NDT used for the composite. (10 Marks)

OR

10 a. Discuss ultrasonic testing of composites mentioning its merits. (10 Marks)
  b. Discuss the application of composite for
    i)   Aerospace industry
    ii) Automotive industry
    iii) Electrical, Health sector
    iv) Sports and recreational sector. (10 Marks)

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