CBCS SCHEME

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18AE54

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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 composite materials. Explain Thermoset and Thermoplastic polymers. **(10 Marks)**

b. List Advantages, Disadvantages and applications of composites. **(10 Marks)**

OR

2 a. List all the liquid state fabrication of metal matrix composites? With a neat sketch explain any one method of liquid state fabrication of metal matrix composites. **(10 Marks)**

b. Explain:
i) Particulate composite
ii) Fibrous composites
iii) Whiskers
iv) Flakes. **(10 Marks)**

Module-2

3 a. With a neat sketch, explain Hand layup process? List advantages, disadvantages and application of Hand layup process. **(10 Marks)**

b. With a neat sketch, explain, pultrusion process? And also list and advantages, Disadvantages and applications of pultrusion process. **(10 Marks)**

OR

4 a. Explain with neat sketch :
i) Extrusion process
ii) Injection molding. **(10 Marks)**

b. Explain:
i) Adhesive bonding
ii) Drilling
iii) Cutting processes. **(10 Marks)**

Module-3

5 a. Derive density interms of volume fraction. **(06 Marks)**

b. What are the assumptions in a typical micro mechanical analysis? **(06 Marks)**

c. Derive the equation for elastic modulus of a composite laminate. **(08 Marks)**

OR

6 a. Define volume and mass fractions of fibre and matrix and derive expression for them. **(08 Marks)**

b. What are the assumptions made in macro-mechanics? **(04 Marks)**

c. Using strength of materials approach, derive expression for effective axial modulus, Poisson's ratio and transverse modulus. **(08 Marks)**

Module-4

7 a. Discuss modes a failure in composites. (05 Marks)

b. Explain maximum stress and maximum strain failure theories used in the composites. (10 Marks)

c. List merits and demerits of T-sai-hill failure theory. (05 Marks)

OR

8 a. Derive the expression for [A] [B] and [D] matrices for laminate. (14 Marks)

b. Explain the basic assumptions in the classical laminate plate theory. (06 Marks)

Module-5

9 a. With a neat sketch, explain any one type of Non-Destructive Testing (NDT)? (10 Marks)

b. With a neat sketch, explain any one type of Destructive testing. (10 Marks)

OR

10 a. Discuss the applications of composites from day to day requirements to the advance applications in space with example. (15 Marks)

b. Explain future potential of composites. (05 Marks)

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