

Total No. of Questions : 8]

SEAT No. :

P348

[Total No. of Pages : 2

[6003]-429

T.E. (Mechanical)

COMPOSITE MATERIALS

(2019 Pattern) (Semester - II) (302052 - A) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates.

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right side indicate full marks.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data if necessary.

- Q1)** a) Give the advantages and drawbacks of metal matrix composites over polymer matrix composites. [6]
- b) Explain the Squeeze casting process of fabrication of a metal matrix composite in detail. [6]
- c) What is diffusion bonding? Explain the metal matrix composites produced using diffusion bonding techniques? [6]

OR

- Q2)** a) Describe liquid infiltration process with a neat sketch. [6]
- b) Explain in detail that metal matrix composites are fabricated using a powder metallurgy process. [6]
- c) Explain the spray forming process of fabrication of a metal matrix composite in detail. [6]

- Q3)** a) Find the ultimate transverse tensile strength for a unidirectional glass/epoxy lamina with a 70% fiber volume fraction. Assume that the fibers are circular and arranged in a square array. Take, Young's modulus of fiber (E_f) is 85 GPa, Young's modulus of matrix (E_m) is 3.4 GPa, Ultimate strength of fiber (σ_f) ult is 1550 MPa, Ultimate strength of matrix (σ_m) ult is 72 MPa. [6]
- b) Derive an expression for the volume and weight fraction of composites. [6]
- c) Write a short note on large particle composites. [5]

OR

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- Q4)** a) Derive the rule of mixture equation. [6]
b) What is a void fraction? What are the properties it governs? [6]
c) What do you mean by micro-mechanics and macro-mechanics of lamina? [5]

- Q5)** a) Describe with the help of a neat sketch the fatigue testing of polymer matrix composite. [6]
b) What is bond strength or ply adhesion in polymer matrix composite? Demonstrate its test procedure according to ASTM F 904. [6]
c) Explain any two non-destructive testing for polymer matrix composites. [6]

OR

- Q6)** a) Discuss common mechanical tests for composites mentioning the purpose of each test. [6]
b) What is fracture toughness of composite? Sketch different fracture modes to interpret the fracture failure. [6]
c) List the various international and national test standards developed to test mechanical properties of a lamina. [6]

- Q7)** a) State any three advantages and three disadvantages of using glass epoxy Composite in Aircraft. [6]
b) State any six advanced properties of Composite materials that makes it a better substitute to steel in an Automobile industry. [6]
c) What is multi-material technology? State any three benefits of multi-material technology in Automobiles. [5]

OR

- Q8)** a) State any three advantages and three disadvantages of using Boron Epoxy Composite in Aircraft. [6]
b) Name the composite that can make the automobile light weight? State any four advantages of the vehicle being light weight? [6]
c) Write any three advantages of Composite material over wood in building a boat? What will be preferred as a resin for building boat? [5]

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