Total No. of Questions : 8]

SEAT No. : ____

PA-1537

[Total No. of Pages : 3

[5926]-157

T.E. (Mechanical)

COMPOSITE MATERIALS (Theory)

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

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.***
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) What is diffusion bonding? Explain the metal matrix composites produced using diffusion bonding techniques? **[7]**

b) Explain the Squeeze casting process of fabrication of a metal matrix composite in detail. **[7]**

c) Give the advantages and drawbacks of metal matrix composites over polymer matrix composites. **[4]**

OR

Q2) a) Explain the spray forming process of fabrication of a metal matrix composite in detail. **[7]**

b) Explain in detail that metal matrix composites are fabricated using a powder metallurgy process. **[7]**

c) State the advantages of metal matrix composites over monolithic metals. **[4]**

Q3) a) A glass/epoxy lamina consists of a 70% fiber volume fraction. The density of fiber is 2500 kg/m3 and the Density of matrix is 1200 kg/m^3. Determine : **[7]**

i) Density of lamina

ii) Mass fractions of the glass and epoxy

iii) The volume of composite lamina if the mass of the lamina is 4 kg

iv) Volume and mass of glass and epoxy in part (3)

P.T.O.

b) What is meant by optimum design of composite materials? State the various steps involved in it. **[6]**

c) Write a short note on large particle composites. **[4]**

OR

Q4) a) What is the void fraction? What properties did it affect? Derive the relation between theoretical density and experimental density. **[7]**

b) Write a note on flexural testing of composites of unidirectional composites. **[6]**

c) What do you mean by micro-mechanics and macro-mechanics of lamina? **[4]**

Q5) a) Explain fatigue testing of unidirectional composites according to ASTM standards. **[7]**

b) What is the significance of Bond strength / Ply Adhesion? Explain the ASTM F904 method. **[7]**

c) What do you understand by test environments? **[4]**

OR

Q6) a) Explain the Following Non-destructive testing methods for a composite material with a neat sketch : **[7]**

i) X - Ray Radiography

ii) Ultrasonic Testing.

b) Explain compression testing of unidirectional composites according to ASTM standards. **[7]**

c) What is thermographic testing of Composite? **[4]**

Q7) a) Explain in details Light Combat Aircraft (LCA) and Light Combat Helicopter (LCH). **[7]**

b) Write a short note on Rapid Prototyping in composite used in the automobile industry. **[6]**

c) List & describe the applications of composite for the Sports Industry. **[4]**

OR

Q8) a) Explain the "Multimaterial" concept used in the automobile industry with example. **[7]**

b) What are the applications of Composite for Infrastructure and Building Applications? **[6]**

c) List & describe the applications of composite for the Energy Sector. **[4]**

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