CBCS SCHEME

USN | | | | | | | | | | |

18MAR333

Third Semester M.Tech. Degree Examination, Jan./Feb. 2021
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. Briefly explain the classification of composites. **(10 Marks)**

b. List out the advantages and disadvantages of composites. **(05 Marks)**

c. Mention the applications of composites in i) Air craft industries ii) Space craft industries iii) Marine industries. **(05 Marks)**

OR

2 a. What are the functional requirements of matrix and reinforcement? **(10 Marks)**

b. Explain the effect of size, shape, distribution and volume fraction of reinforcement on the performance of composite. **(10 Marks)**

Module-2

3 a. Describe polymer matrices and ceramic matrices used in composites. What are their advantages and disadvantages? **(10 Marks)**

b. List out the different types of metallic matrices, why aluminium is used as matrix in most of metal matrix composites? Explain. **(10 Marks)**

OR

4 a. Explain the manufacturing process of glass fibre and carbon fibre. **(10 Marks)**

b. Briefly explain the different types of ceramic reinforcements used in composites. **(10 Marks)**

Module-3

5 a. Explain how metal matrix composites are manufactured using solid state diffusion technique. State its advantages and disadvantages. **(10 Marks)**

b. Briefly explain the steps involved in hot isostatic pressing techniques of manufacturing of composites. **(10 Marks)**

OR

6 a. How ceramic matrix composites are produced using liquid metal infiltration technique? Explain. **(10 Marks)**

b. Describe the methods used for the manufacturing of Carbon-Carbon composites. **(10 Marks)**

Module-4

7 a. Explain the steps involved in prepeg technique of manufacturing of polymer matrix composites. **(08 Marks)**

b. Clearly explain the hand-lay-up process used in the manufacture of PMCs. Mention its advantages, disadvantages and applications. **(12 Marks)**

OR

8 a. What is filament winding? Explain with a neat sketch the processes involved in filament winding. Mention its advantages and disadvantages. **(10 Marks)**

b. Write a note on: i) Compression molding ii) Injection moulding. **(10 Marks)**

Module-5

9 a. How do you determine failure of a composite using i) Maximum stress criteria ii) Maximum strain criteria. **(10 Marks)**

b. Assume that one is applying a load of $\sigma_x = 2\text{MPa}$, $\sigma_y = -3\text{MPa}$, $\tau_{xy} = 4\text{MPa}$ to a 60° angle lamina of graphite/epoxy. Find the strength ratio using maximum stress failure theory.
Given that $\left(\sigma_1^T\right)_{ult} = 1500\text{MPa}$, $\left(\sigma_1^C\right)_{ult} = 1500\text{MPa}$, $\left(\sigma_2^T\right)_{ult} = 40\text{MPa}$, $\left(\sigma_2^C\right)_{ult} = 246\text{MPa}$, $\left(\tau_{12}\right)_{ult} = 68\text{MPa}$. **(10 Marks)**

OR

10 a. Write a note on ply discount truncated maximum strain criteria. **(10 Marks)**

b. Explain the use of caplet plots in strength design of laminated composites. **(10 Marks)**

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