Code No:158AJ **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech IV Year II Semester Examinations, July - 2023
COMPOSITE MATERIALS
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What are the main constituents of composite material?	[2]
b)	What is reinforcement? Give any two examples.	[3]
c)	Write two properties of Boron reinforcement.	[2]
d)	What is the role of interfaces in the bonding of composites?	[3]
e)	Mention two applications of ceramic matrix composite.	[2]
f)	Write any three properties of polymer matrix composites.	[3]
g)	Mention mechanical bonding techniques in metal matrix composites.	[2]
h)	What are discontinuously reinforced metal matrix composites?	[3]
i)	Distinguish between micro and macro mechanics approaches.	[2]
j)	Differentiate orthotropic materials from isotropic materials.	[3]

PART – B

(50 Marks)

2.a) What are advanced composites? List and briefly explain the limitations of composite materials.
b) Describe the future potential of composite materials. [5+5]

OR

3.a) How are composites classified? Briefly explain each type of composites with their merits and demerits.
b) Enumerate six primary material selection parameters that are used in evaluating the use of a particular material. [4+6]

4.a) List out the properties and uses of carbon-carbon composites.
b) Discuss the influence of shape, size, and particle distribution on the properties of metal matrix composites. [5+5]

OR

5.a) Differentiate between Knitting, Braiding and Weaving.
b) Explain the role of reinforcements in metal matrix composites. [5+5]

6. Briefly explain the following with help of suitable example.
a) Liquid metal infiltration
b) Liquid phase sintering. [5+5]

OR

7.a) Explain: i) Calendaring and ii) Thermoforming
b) What do you understand by thermoplastics and thermosets? [5+5]

8.a) Explain the solid-state processing of metal matrix composites.
b) Find three applications of metal matrix composites. [5+5]

OR

9.a) Highlight the advantages of metal matrix composites over polymer matrix composites.
b) Discuss any one technique of producing metal matrix composites. [5+5]

10.a) Explain the Tsai-Hill failure criteria for composites.
b) Stating generalized Hook's law, reduce the elastic constants from the anisotropic material to an isotropic material. [5+5]

OR

11. Describe the two experimental methods to determine the mechanical properties of a composite material according to ASTM standards. [10]

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