

Code No:158AJ

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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)

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|------|---|-----|
| 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)

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|------|--|-------|
| 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

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|------|---|-------|
| 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] |

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|------|---|-------|
| 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

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

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

OR

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



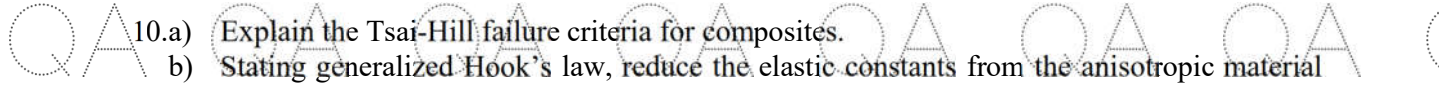
- 8.a) Explain the solid-state processing of metal matrix composites.
b) Find three applications of metal matrix composites.

[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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