

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURAJADA VIZINAGARAM
II B. Tech I Semester Regular/Supply Examinations, November – 2025
MATERIAL SCIENCE AND METALLURGY
(ME)

Time: 3 hours**Max. Marks: 70***Question paper consists of Part A, Part B.**Part A is compulsory, Answer all questions.**In Part B, Answer any one question from each unit.************PART-A****(20 Marks)**

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|---|----|---|-----|
| 1 | a) | Compare fine grain metal with a coarse grain metal | [2] |
| | b) | What is phase rule? | [2] |
| | c) | Write a note on Al-Si alloys. | [2] |
| | d) | What are the properties of Magnesium alloys? | [2] |
| | e) | When will you prefer annealing? | [2] |
| | f) | What is meant by normalising? | [2] |
| | g) | List the methods of producing metal powders. | [2] |
| | h) | What are the merits of Electrolytic Deposition? | [2] |
| | i) | List abrasive materials. | [2] |
| | j) | What is matrix? What are various types of matrices used in composite materials? | [2] |

PART-B**(50 Marks)****Unit-1**

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|---|----|--|-----|
| 2 | a) | Classify in detail the different types of crystal imperfections. | [5] |
| | b) | List and explain the methods of construction of phase diagrams. How many degrees of freedom do exist at invariant reaction points in binary phase diagram? | [5] |

(OR)

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|---|----|--|-----|
| 3 | a) | Discuss the effect of grain boundaries on the mechanical properties. | [5] |
| | b) | What is Gibb's phase rule? Explain its importance. | [5] |

Unit-2

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|---|----|---|-----|
| 4 | a) | Classify different types of cast iron. Why silicon is added to cast iron? | [5] |
| | b) | Enlist the properties of pure Aluminum and mention the composition, specific properties and applications of any one aluminum alloy. | [5] |

(OR)

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|---|----|---|-----|
| 5 | a) | What are the types of copper alloy, their composition, properties and applications? | [5] |
| | b) | Explain the structure and properties of plain carbon steels. | [5] |

Unit-3

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| 6 | a) | Discuss different types of annealing processes. | [5] |
| | b) | Explain the processes of Nitriding. When do you use it | [5] |

(OR)

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| 7 | a) | Write full name of TTT diagram and explain how it is constructed. | [5] |
| | b) | Explain in detail on age hardening treatment. | [5] |

Unit-4

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| 8 | | Discuss about atomization process of producing powders and its advantages. | [10] |
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(OR)

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| 9 | | Discuss in detail on the pressure-less compaction and pressure compaction techniques in powder metallurgy. | [10] |
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Unit-5

- 10 a) Write the classification of ceramic materials and their characteristics. [5]
b) What are their typical applications of metal matrix composites? [5]
- (OR)
- 11 a) Explain the classification of composite material with examples. [5]
b) Discuss various reinforcing patterns of fibers being used in composites. [5]
