

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY- GURAJADA VIZIANAGARAM
II B. Tech I Semester Regular Examinations, November – 2024
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)**

- 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**

- 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)

- 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

- 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)

- 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

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

(OR)

- 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

- 8 Discuss about atomization process of producing powders and its advantages. [10]

(OR)

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

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]
