

MATERIAL SCIENCE & ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define grain and grain boundary.
 - Define packing factor.
 - What is the significance of phase rule?
 - What do you understand by eutectic and eutectoid reactions?
 - What are four basic types of cast irons?
 - What is meant by super alloy and wrought alloy?
 - What is recrystallization?
 - Define hardness and hardenability.
 - What is the difference between tempered and laminated glass?
 - What is meant by whiskers and yarns?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Define crystallization of metal. Explain briefly about crystal dislocation.
(b) Explain in brief about the conditions of Hume-Rothery rules.

OR

- 3 Calculate atomic packing factors for following structures:
(a) Body centred cubic structure.
(b) Face centred cubic structure.

UNIT – II

- 4 (a) What is the significance of lever rule? Explain in detail.
(b) List five suitable applications where eutectic alloys are used.

OR

- 5 Draw Iron-Iron carbide equilibrium diagram and label temperatures, composition and phases.

UNIT – III

- 6 (a) Explain briefly about classification of steels.
(b) Discuss about Cupronickels and Beryllium Bronze alloys.

OR

- 7 (a) Write short notes on the following:
(i) Ferritic stainless steels. (ii) Martensitic stainless steels. (iii) Austenitic stainless steels.
(b) Describe alloy and temper designation of A1 and its alloys.

UNIT – IV

- 8 What is the significance of TTT diagram? Draw TTT diagrams for eutectoid, hypo-eutectoid and Hyper-eutectoid steels. What are the effects of carbon on TTT diagram?

OR

- 9 (a) Explain briefly about four simple heat treatment processes.
(b) Explain briefly about any two surface treatment processes.

UNIT – V

- 10 (a) Explain briefly about the properties of ceramics.
(b) What is the significance of polymers matrix material in fibre-reinforced composites? Explain briefly.

OR

- 11 (a) List any five types of glasses with composition and uses.
(b) Briefly explain about carbon-carbon composites and hybrid composites.
