

II B. Tech I Semester Supplementary Examinations, October/November - 2019
METALLURGY AND MATERIAL SCIENCE
 (Com. to ME, AME)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) Define coordination number and atomic packing factor. (3M)
- b) Explain HCP structure. (3M)
- c) Explain the importance of Lever rule. (4M)
- d) Write any four applications of fiber reinforced composites. (4M)
- e) Explain how a fatigue fracture occurs. (4M)
- f) What properties would be important in the choice of a copper alloy spring? (4M)

PART -B

2. a) Discuss (i) intermediate alloy phase and (ii) electron compounds. (8M)
- b) What is allotropy? Explain with suitable examples? (8M)
3. a) Explain Hume - Rotherys rules for the formation of substitutional solid solutions. (8M)
- b) Explain the following: i) Peritectic reaction. ii) Eutectoid reaction. (8M)
4. a) Explain the microstructure, properties and applications of Malleable cast iron. (8M)
- b) Describe the allotropic transformations of pure iron. (8M)
5. a) Describe completely the changes that take place during the slow cooling of 0.5% carbon steel from the austenite range to room temperature. (8M)
- b) Define critical cooling rate. What factors influence the critical cooling rate? Explain. (8M)
6. a) Explain the Al-Cu binary alloy system with phase diagram. (8M)
- b) Discuss the α and β phases of a Ti alloy. (8M)
7. a) Why do the materials change their properties at the nano level? Explain. (8M)
- b) What is the purpose of MgO and Al₂O₃ additions to soda-lime glass? (8M)