

B.Tech I Year II Semester (R15) Supplementary Examinations December 2019

**MATERIAL SCIENCE & ENGINEERING**

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**  
(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

- (a) What is grain size? List the factors that promote fine grain in a casting.
- (b) What are electron compounds? Give examples.
- (c) What information will you get from an equilibrium diagram?
- (d) Draw the hypothetical equilibrium diagram for two metals insoluble in the liquid and solid states.
- (e) Differentiate between the microstructure of gray cast iron and malleable cast iron.
- (f) Why do aluminium alloy rivets have to be refrigerated until used?
- (g) What is the purpose of adding alloying elements?
- (h) What is cryogenic treatment?
- (i) What is crystallization?
- (j) Write a rule of mixture for an upper bound and lower bound.

**PART – B**  
(Answer all five units, 5 X 10 = 50 Marks)**UNIT – I**

2 Determine the packing factor for both FCC and BCC structure. Which structure is densely packed? Show with sketches.

**OR**

3 Sketch and explain the cooling curve for solid solution with an example.

**UNIT – II**

4 Sketch and explain the phase diagram illustrating the eutectoid reaction.

**OR**

5 Sketch and explain the cooling curve and the microstructure during the slow cooling of 65A-35B alloy.

**UNIT – III**

6 Sketch and explain the size and distribution of graphite flakes in gray iron.

**OR**

7 How are copper alloys classified? With a neat sketch, explain the phase diagram of Cu-Zn.

**UNIT – IV**

8 Explain in brief the effect of alloying elements on iron-iron carbon system.

**OR**

9 Explain the process of heat treatment of plastics.

**UNIT – V**

10 Explain the influence of fiber orientation and concentration on strength of composites.

**OR**

11 What are metal matrix composites? List its applications.

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