

B.Tech II Year I Semester (R13) Supplementary Examinations June 2016

**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)
- 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.

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

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