Subject : Material science and engineering

Question : Model Question Paper

Answer :

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)
   a) Define grain and grain boundary.
   b) Define packing factor.
   c) What is the significance of phase rule?
   d) What do you understand by eutectic and eutectoid reactions?
   e) What are four basic types of cast irons?
   f) What is meant by super alloy and wrought alloy?
   g) What is recrystallization?
   h) Define hardness and hardenability.
   i) What is the difference between tempered and laminated glass?
   j) 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

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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 composite and hybrid composites.

Code: 9A03301

R09

B. Tech II Year I Semester (R09)
Supplementary Examinations, May 2013
MATERIAL SCIENCE & ENGINEERING

(Common to AE, ME and MCT)

Time: 3 hours Max. Marks: 70

1 (a) Describe the reasons for high thermal and electrical conductivity in metallic bonded solids.
(b) Explain the comparison method of estimating the grain size.

2 (a) What is an alloy system and explain the alloying systems?
(b) What is a compound and explain the interstitial compounds?

3 (a) Classify and explain transformations in the solid state.
(b) What is incongruent melting intermediate phase and draw the phase diagram illustrating it?

4 (a) Explain how alloying elements that dissolve in ferrite increases its strength.
(b) Explain the difference in microstructure and properties of white and gray cast iron.

5 Explain the following:
(a) Flame hardening.
(b) Induction hardening.

6 What is a brass? Explain red brasses.

7 What is ceramic? Explain crystalline ceramics.

8 Define composite and explain matrix phase & dispersed phase.