Total No. of Questions :5] *[Total No. of Printed Pages :2*

Roll No .....

AU/ME/IP/IEM/PR - 402

B.E. IV Semester

Examination, June 2014

Material Science And Metallurgy

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Explain Metallic Bond found in metals. 2
   b) Explain BCC structure with an example 2
   c) Explain acid refractories and its application. 3
   d) Describe briefly the manufacturing process of Iron with labeled diagram? 7

   OR

   Describe briefly any steel making process? 7

2. a) Explain imperfections found in crystals. 2
   b) Explain slip mechanism of deformation of metals. 2
   c) What is Burger vector? Explain Burger circuit. 3
   d) Derive an equation for the calculation of critical resolved shear stress for a single crystal. 7

   OR

   Why annealing of cold work metal is done? Explain recovery, recrystallization and grain growth. 7

3. a) What is solid solutions? 2
   b) Explain Gibb's phase rule? 2
   c) Explain Hume Rothery's rules for substitutional solid solutions. 3
   d) Explain equilibrium diagram for a binary system showing complete solubility in liquid and solid state. 7

   OR

   Explain Iron - Carbon equilibrium diagram and list the advantages and limitations of the diagram. 7

4. a) Explain purpose of Heat treatment process. 2
   b) Name different methods of Hardening. 2
   c) Write short note on TTT curves. 3
   d) Define the term hardenability. What factors affect hardenability? Describe a method for determining the hardenability of steel. 7

   OR

   Explain:-

   i) Nitriding process and its advantages and disadvantages. 3½

   ii) Cyaniding process and its advantages and disadvantages. 3½

5. a) Explain properties and applications of composite materials. 2
   b) Explain properties and applications of plastics. 2
   c) Explain Elastomers and their applications. 3
   d) Explain various processes and methods of making products by powder metallurgy techniques. 7

   OR

   Describe briefly the plastic molding technology? 7

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