Total No. of Questions :5]

Roll No .....

AU/IP/ME/PR - 402

B.E. IV Semester

Examination, June 2015

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 questions 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.

UNIT - I

1. a) What is a unit cell? Discuss the BCC, FCC and HCP types of unit cell.

   b) What are the various types of binding in materials? Explain Vander Wall's binding.

   c) What does the term 'Refractory' means. Discuss neutral refractories, their applications and properties.

   d) Enlist the various methods of making iron and steel and explain any one process in detail.

   OR

   Discuss the method of calculating the interatomic distance in a crystal lattice. Also calculate the lattice constant 'a' for a substance with face centred cubic lattice having density of 6250 kg/m^3 and molecular weight 60.2.
   Given Avogadro No. = 6.02×10^{26} kg/mole.

UNIT - II

2. a) Differentiate point and line defects in a crystal.

   b) Differentiate between hot working and cold working process.

   c) What is crystal imperfections. Define various point defects in a crystal structure.

   d) Explain Griffith's theory for fracture. Also write the expression of Miner's linear rule for cumulative fatigue damage.

OR

Explain the terms slip and twin. How does they occur. Enumerate the difference between the two.

UNIT - III

3. a) What is a solid solution? Enlist their types.

   b) Write short note on following intermetallic compounds in iron carbon equilibrium diagram :

      i) Bainite ii) Troosite

   c) Explain Eutectic and Eutectoid reaction in equilibrium diagram.

   d) Explain critical point related to heat treatment of steel. Describe it with the help of phase transformation diagram.

OR

Explain the following :

i) Hume - Rothery's rules

ii) Gibb's Phase rule

UNIT - IV

4. a) What are objectives of heat treatment?

   b) Compare annealing and normalizing processes.

   c) Explain the phenomenon of precipitation hardening in aluminium alloys.

   d) What is T.T.T. curve? Explain the effect of cooling rate on the properties obtained after heat treatment.

OR

Write short note on following processes :

i) Spheroidizing

ii) Martempering

iii) Austempering

UNIT - V

5. a) Draw creep test curve, showing different stages of creep.

   b) What are elastomers? Enlist its characteristics.

   c) What is powder metallurgy? Enlist it's advantages.

   d) What is brass? Enlist various types of brasses and explain any three in details.

OR

What is Plastic Molding? Name different types of Plastic Molding processes and explain any one in detail.

******