[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2066)

16137(J)

B. Tech 6th Semester Examination

Materials Technology (NS)

ME-326 June-16

Time : 3 Hours Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidates are required to attempt five questions in all selecting one question from each section A, B, C, & D and all the subparts of the questions in Section E

SECTION - A

1. (a) Distinguish between substitution solid solutions and interstitial solid solutions. (10)

   (b) List the general considerations for selection of materials. (10)

2. Draw the iron-carbon equilibrium diagram and label all fields. Using this diagram explain the solidification of hyper eutectoid steels and hypo eutectic cast iron. (20)

SECTION - B

3. (a) Explain the term recovery, recrystallisation and grain growth. (10)

   (b) What is allotropy? Discuss the significance of allotropism shown by iron. (10)

[P.T.O.]

4. (a) Explain the mechanism of plastic deformation by slip and twinning with neat sketch. (10)

   (b) What is slip system? How it is related to dislocation for FCC, BCC and HCP crystals? (10)

SECTION - C

5. Distinguish between composites and metal alloys. Compare the advantages and limitations of metal matrix composites, reinforced plastic and ceramic-matrix composites. Give specific applications of these three types of composites. (20)

6. Discuss the effect of the addition of the following elements on the properties of medium carbon steels

   (i) Nickel

   (ii) Cobalt

   (iii) Tungsten

   (iv) Chromium (20)

SECTION - D

7. Explain various elements of failure analysis, enumerate various steps involved in investigating a failure. (20)

8. (a) Iron tested at –196°C is brittle. It, however, becomes ductile at this temperature, if a thin layer of silver is diffused along the grain boundaries of iron. Explain this change in behaviour. (10)

   (b) (i) Explain why cold worked metals are more susceptible to corrosion than non cold work metals.

   (ii) Briefly explain the methods of surface modifications technique. (10)

SECTION - E

9. (a) Define crystal, space lattice and unit cell.

(b) Distinguish between carburizing and nitriding.

(c) Why slip lines are wavy in BCC metals?

(d) What is the purpose of tempering?

(e) Define Miller Indices and explain the importance.

(f) With neat sketch explain the cooling curve of a pure metal.

(g) Distinguish between Austempering and Martempering.

(h) Show in a diagram the (111) planes of a cubic lattice. Calculate their inter-planar distance.

(i) Calculate the Bragg angle if (111) planes of a cubic (a= 3.57°A) crystal are exposed to X- rays (wavelength is 1.54°A).

(j) Write short note on the brittle fracture theories.

(10×2=20)