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(2063)

816

B.Tech 4th Semester Examination

Material Science & Engg.

ME-4006

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 : Attempt one question each from A, B, C and D sections. Section E is compulsory.

SECTION - A

1. (a) Discuss in detail the crystal imperfection and their classifications. **(10)**

   (b) A substance with F.C.C. lattice has density 6250 kg/m^3 and molecular weight 60.2. Calculate the lattice constant 'a'. **(10)**

2. (a) What will be the density of planes (100), (111), (110) and (210) in a cubic lattice(P)? Given a = 2.5 × 10^{-8} cm. **(10)**

   (b) Discuss in detail the effects of imperfections on metal properties. **(10)**

SECTION - B

3. (a) Describe the phase changes during solidifications of Fe –045% alloy. And also Fe –C diagram in detail. **(10)**

(b) What are solid solutions and give their types in detail along with examples. **(10)**

4. (a) What do you understand by heat treatment? Mention and discuss the various stages in detail. **(10)**

(b) What is TTT diagram and importance of these diagrams? What information is supplied by these diagrams? **(10)**

SECTION - C

5. (a) What is Recovery, Recrystallization and grain growth? Discuss in detail. **(10)**

(b) Explain: Twining and discuss conventional and true stress and strain curves for polycrystalline materials. **(10)**

6. (a) Explain Banschinger effect, season cracking and yield point phenomenon in detail. **(10)**

(b) What is critical resolved shear stress? On what factors does it depend? Also explain strain and age hardening. **(10)**

SECTION - D

7. (a) Describe various methods of failure analysis. What is fracture & its types? **(10)**

(b) Explain S.N. curve, fatigue limit mechanism of fatigue & factors affecting fatigue. **(10)**

8. (a) What is creep curve? What is the impact of time and temperature on creep? Discuss prevention against creep. **(10)**

(b) What is the mechanism of corrosion? Discuss effect and prevention of corrosion. **(10)**

SECTION - E

9. (a) What are edge and screw dislocations?

(b) What are Eutectoid and Peritectic reactions?

(c) What is martensite?

(d) What is plastic deformation?

(e) What is hardenability?

(f) What is Miner's law?

(g) What is Gibb's phase rule?

(h) What is significance of 'Lever rule'?

(i) Discuss cooling curve in case of solid solutions.

(j) What is flame and induction hardening?

(10×2=20)