Third Semester B.E. Degree Examination, Dec.08/Jan.09
Material Science and Metallurgy

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Define space lattice. Find out basic atoms and packing factors or packing densities for B.C.C. and F.C.C. Draw concerned figures. **(08 Marks)**

b. Explain crystal imperfections with figures. **(08 Marks)**

c. State Fick's laws of diffusion. **(04 Marks)**

2 a. Define Engg. Stress and strain and true stress and strain. Find out the relationship between True stress and Engg. Stress. **(08 Marks)**

b. Define hardness. Draw the figure of Brinell Hardness Testing machine and label the parts. **(05 Marks)**

c. Explain Slip and Twinning with figures. **(07 Marks)**

3 a. Explain types of fractures with figures. **(06 Marks)**

b. Explain creep curve. **(08 Marks)**

c. Explain factors affecting fatigue life. **(06 Marks)**

4 a. Define solid solutions and explain different types of solid solutions with figures. **(08 Marks)**

b. State Gibb's Phase rule and define the terms used. Discuss its importance. **(06 Marks)**

c. Explain the construction of phase diagram with figure. **(06 Marks)**

PART – B

5 a. Draw Fe-C equilibrium diagram and label it. Show the invariant points on it. Write the reactions occurring at these points indicating the temperature and composition of each phase. **(08 Marks)**

b. Explain the construction of TTT diagram with figure and label it. **(08 Marks)**

c. Define Martensite, Cementite, Austenite and Ferrite. **(04 Marks)**

6 a. Define Hardenability. Explain Jominy end quench tests with related figures. **(10 Marks)**

b. Explain Austempering and Martempering with figures. **(10 Marks)**

7 a. Explain different types of cast irons with microstructures. **(08 Marks)**

b. Write short note on Al-alloy. **(04 Marks)**

c. Define Brasses. Explain season cracking of brass and how to eliminate it. **(04 Marks)**

d. Define Bronze. Explain Tin bronze's antifriction properties. **(04 Marks)**

8 a. Write a note on passivation. **(06 Marks)**

b. Explain the alloying method for corrosion protection. **(07 Marks)**

c. Explain cathodic protection with figures. **(07 Marks)**

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