

MECHANICAL ENGINEERING BRANCH

FOURTH SEMESTER-REGULATION 2012

ML8351 ENGINEERING MATERIALS AND METALLURGY

Time: 3Hr

Max.Mark:100

Answer ALL Questions

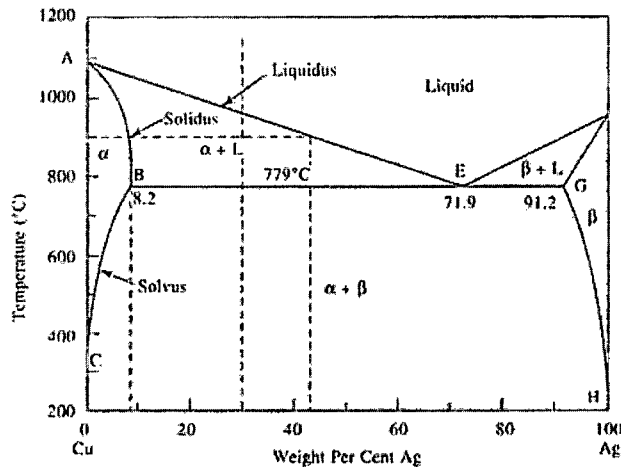
Part –A (10x2=20 Marks)

1. Draw a cooling curve of 'pure metal' and 'alloy' and mark the regions
2. Pearlite formation is diffusion process-True or false: Justify your answer
3. List out the elements that do not alloy with iron.
4. What are the diffusion mechanisms?
5. What does AZ92A refer to?
6. Match the following

a. Ni based super alloys	1. Magnetic applications
b. Invar(Fe/35 Ni)	2. Gas turbine blades
c. Permalloy	3. HCP < -- > BCC
d. Ti alloy	4. metrology standards
7. Distinguish between addition and condensation polymerization.
8. Why properties of nanomaterials are superior to its microcrystalline?
9. Draw a fatigue cycle for R=-1
10. Distinguish between intergranular and transgranular fracture.

Part – B (5x16 = 80 Marks)

- 11 (i) The alloy phase diagram of Cu-Ag system is given in fig. An alloy of Cu-30 wt% Ag is cooled slowly from 1200°C. From the data given in the phase diagram calculate the following: (i) The amount of liquid and proeutectic α at 900°C, (ii) the amount of Proeutectic α and liquid formed just before the eutectic reaction (iii) the amount of α and β formed at 600°C. (6)



- (ii) Draw the iron-iron carbide equilibrium diagram and mark all the regions and explain the important reactions (10)

- 12a** (i) Calculate the critical radius of homogeneous nucleation (8)
(ii) Explain (a) Martempering (b) annealing (8)
OR
- 12b** (i) What is carburizing? Explain the different types of carburizing. Discuss the property changes after the carburizing (16)
- 13a** (i) Discuss the mechanism of precipitate strengthening (8)
(ii) Discuss the characteristics of different types of cast-iron (8)
OR
- 13b** (i) Discuss the effect of alloying additions (Mn, Si, Cr, Mo, V, Ti & W) on steel (10)
(ii) Write the properties and applications of brass (6)
- 14a** (i) Discuss the properties and applications of Al_2O_3 and SiC (8)
(ii) Discuss the applications of (a)PMMA (b)PVC (c)HDPE (8)
OR
- 14b** (i) How composites are different from alloys. What are the matrix and reinforcement materials for MMCs (4)
(ii) Explain the toughening mechanism of CMCs (4)
(iii) Derive an expression to calculate the young's modulus of the composite material along the fiber direction (8)
- 15a** (i) What is fatigue? Explain the mechanism of fatigue fracture and explain the method to improve the fatigue life of the component (10)
(ii) Explain the effect of temperature on the impact energy (6)
OR
- 15b** (i) Explain the different mechanisms of plastic deformation (6)
(ii) With the characteristic curve, explain the creep deformation mechanism (10)