Special Examination, 2012

MATERIAL SCIENCE

Full Marks -70

Time:3Hour

Answer question No 1 which is compulsory and any Five from the rest

The figures in the right hand margin indicate marks

1. Answer the following questions   (2x10)

(a)When a material is said to be non-linear material

(b) Mention the position of Fermi level in an intrinis and extrinsic semiconductors at 0K.

(c)Mention any four application of hall effect.

(d) What do you mean by penetration depth? Does it depends on temperature

(e)Give four example of Tc,oxide super conductor

(f) Write a notes on fiber on fiber optical medical endoscopy.

(g)Distinguish between spontaneous and stimulated emission

(h)What do you mean by the thermoplastic and thermosetting pastic

(i) What is the advantage of slip casting

(j)Define glass transition temperature

Q.2 (a) Discuss band theory of free electron .using band theory of solids How can you distinguish between conductor insulator and semiconductor..   (4)

 (b) What temperature the probality of electrons is 10% in sliver which have energy 1% above Fermi energy? E_f for sliver =5.5eV   (3)

(c))Derive an expression for thermal and electrical conductivity using Drude Lorentz theory   (3)

 Q.3 (a)What are super conductor ?Discuss the important property changes that occurs in material when they changes from normal to super conducting state.   (4)

(b)Calculate the critical current and critical current density of lead wire of radius 5mm at 5k Tc for Pb=7.19K and Bc=80.3X10^{-3} Telsa at 0K   (2)

(C)Derive an expression for diamagnetic susceptibility for a diamagnetic material using classical Langevin,s classical theory of diamagenetism   (4)

4.(a)Explain clearly the difference between hard and soft magnetic materials   (5)

(b)A magnetic material has a magnetization at 3400 amperes/ meter and flux density of 0.0044wb/m^2 .Calculate the magnetizing field and the relative permeability of material

(3)

(c) Distinguish between ferromagnetic ,ferromagnetic and anti ferromagnetic material .Give an example for each class of material .Discuss various use of ferrites   (2)

Q.5(a) Describe the principle of laser action .   (3)

(b) Explain how optical fibers are classified   (3)

(c) Draw the block Diagram of Fiber optic communication system and explain the function of each element in the system.   (4)

6.(a) Contrast the mechanical characteristics of matrix and dispersed phase for fiber rein forced composite material.   (6)

(b)What are Nano material and mention their properties   (4)

7. (a)What is polymerization ? With help of suitable example ,compare and contrast and process of addition polymerization and condensation polymerization.   (5)

(b)Write the short notes

(i) stress corrosion   (ii) Atmospheric corrosion   (5)

8. (a)Compare and describe the properties of GFRP and CFRP   (5)

(b) Calculate maximum percentage of sulphur that can be present in vulcanized rubber. Why does natural rubber needs vulcanization?   (5) .