L 1150

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

Second Semester

Civil Engineering

PH 1152 — PHYSICS — II

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the merits of classical free electron theory?

2. Define mean free path of electrons.

3. Explain p-type and n-type semiconductors.

4. What is isotope effect in superconductivity?

5. If a magnetic field of 1800 ampere/meter produces a magnetic flux of 3×10^{-5} weber in an iron bar of cross sectional area 0.2 cm^2. Calculate permeability.

6. Explain the space - charge polarization.

7. What are shape memory alloys?

8. What are the characteristics of ceramic materials?

9. What is thermal diffusitivity?

10. A compound bar of Nickel and Copper of equal cross section and equal length is so arranged that free end of copper is in a steam chamber at 100°C and the free end of Nickel is in melting of ice at 0°C. If there is no heat loss at the sides, calculate the temperature of the common junction.

Given K_{Cu} = 390 W/m/K ; K_{Ni} = 60 W/m/K.

PART B — (5 × 16 = 80 marks)

11. Give a detailed account on metallic glasses, their method of production, types, properties and applications.

12. (a) Give the theory of radial flow of heat and describe an experiment to find the thermal conductivity of a rubber tube.

Or

(b) Give a detailed account on thermal insulation and ventilation design of buildings.

13. (a) Derive an expression for the density of states and based that calculate the number of states lying in an energy interval. 0.01 eV above the fermilevel for a crystal of unit volume with fermi energy E_f = 5.00 eV.

Or

(b) Based on Drude and Lorentz theory derive the expression for electrical conductivity and assuming the classical expression for thermal conductivity derive Wiedemann - Franz law.

14. (a) What is Hall effect? Derive the expression for Hall coefficient. Describe an experimental set up for the measurement of the hall coefficient.

Or

(b) Derive an expression for density of holes in the valence band and also explain how does the Fermi level vary with concentration of impurities in P-type semiconductor.

15. (a) Discuss Langevin's theory of a paramagnetic gas and obtain an expression for the paramagnetic susceptibility of a gas. What are the main drawbacks of this theory?

Or

(b) What are magnetic bubbles? How are they used for data storage? Mention their advantages over other materials.
