PART A - (10 x 2 = 20 Marks)

1. Write short note on thermal conductivity.

2. Find the Fermi function value, if the energy of a state 'E' is equal to Fermi energy 'E_F'.

3. Define intrinsic semiconductor and give an example.

4. What is Hall Effect?

5. What is Bohr magnetron? Give its value.

6. Define Para magnetism.

7. Define dielectric constant.

8. Give any two applications of ferroelectric materials.

9. State some applications of shape memory alloys.

10. Write short notes on creep test.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive an expression for electrical conductivity and thermal conductivity of a conductor and hence obtain Wiedemann-Franz law.   (16)

(b) Derive an expression for density of states in a metal and hence obtain the Fermi energy interms of density of free electrons at $0K$. (16)

12. (a) (i) Derive an expression for the carrier concentration in p-type semiconductor. (10)

(ii) Discuss the variation of Fermi level of p-type semiconductor with temperature and impurity concentration. (6)

Or

(b) (i) What is Hall effect? Derive the expression for Hall coefficient. Describe an experimental set up for the measurement for Hall coefficient. (12)

(ii) Mention the applications of Hall effect. (4)

13. (a) (i) Distinguish between soft and hard magnetic materials. (8)

(ii) Explain hysteresis curve on the basis of domain theory of ferromagnetism. (8)

Or

(b) (i) Explain Bardeen-Cooper-Schrieffer theory of superconductors. (8)

(ii) Discuss about high T_c superconductors. (8)

14. (a) (i) What is polarization? Derive an expression for the polarisability in electronic polarization. (10)

(ii) Explain the dependency of polarization on frequency and temperature. (6)

Or

(b) Deduce an expression for the local field in a solid dielectric and hence obtain clausius-mosotti relation. (16)

15. (a) Discuss different types of techniques using synthesis of nano-phase materials and give its applications. (16)

Or

(b) Briefly explain about

(i) Impact (4)

(ii) Fracture (6)

(iii) Fatigue (6)

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