PH 8252 Physics for Information Science

Important 13Mark questions

Unit I

1. Derive the expression for electrical and thermal conductivities of a metal. Hence obtain the expression for Wiedemann-Franz law.
2. Define density of energy states? Derive the expression for the density of energy states in metals.
3. Define Fermi function and Fermi energy. Explain the variation of Fermi function with temperature with graph.

Unit II

1. Derive an expression for density of holes and electrons in valence band and conduction band in the case of p-type and N-type semiconductor.
2. Define Hall Effect. Describe the theory of Hall Effect.
3. Derive the expression for the carrier concentration in an intrinsic semiconductor and show the variation of fermi level with temperature with a neat diagram.

Unit III

1. Describe the domain theory of ferromagnetism and explain various energies involved in domain growth.
2. Distinguish between type I and type II superconductors.
3. Explain BCS theory of superconductivity.
4. Explain SQUID.

Unit IV

1. Explain the different types of polarization mechanisms in dielectrics and sketch their dependence on the frequency of applied electric field.
2. What is meant by dielectric breakdown? Explain the different types of dielectric breakdown.
3. Derive and expression for the Lorentz field developed inside a dielectric material when it is placed in an electric field.

Unit V

1. What are the shape memory alloy? Explain the mechanism of shape memory effect and mention its applications.
2. What are metallic gases? How are they prepared? Explain their use as transformer core material.
3. Explain with necessary diagrams the synthesis of nanomaterials using the following methods
   (a) Chemical vapour deposition
   (b) Pulsed laser deposition.