

SOLID STATE PHYSICS

UNIT – I: Simple Crystal Structure

Crystal Lattice – Primitive and Unit Cell – Seven Classes of Crystals – Bravais Lattice – Miller Indices – Simple Cubic Structure, Body Centered Cubic Structure, Face Centered Cubic Structure, Hexagonal Close packed structure, Sodium Chloride Structure, Zinc Blende Structure, Diamond Structure.

UNIT – II: X- Ray Diffraction

Diffraction of X-Rays by Crystals – Bragg's Law in One Dimension – Experimental Method in X-Ray Diffraction Laue Method, Rotating Crystal Method – Powder Photograph Method – Von Laue's equations - Point Defects, Line Defects – Surface Defects – Volume Defects – Effects of Crystal Imperfections.

UNIT – III: Magnetic Properties

Different Types of Magnetic materials – Classical Theory of Diamagnetism (Langevin's Theory) - Langevin's Theory of Paramagnetism – Weiss Theory of Paramagnetism – Quantum Theory of Ferromagnetism.

UNIT – IV: Dielectric properties

Fundamental Definitions in Dielectrics – Different types of Electric Polarization – Frequency and Temperature Effects on Polarization – Dielectric Loss – Local Field – Clausius –Mossotti Relation – Determination of Dielectric Constant.

UNIT – V: Bonds in Crystals and superconductivity

Type of Bonds in Crystals – Ionic, Valence, Metallic - van der Waal's and Hydrogen Bonding - Qualitative Explanation for the Occurrence of Superconductivity – General Properties of Superconductors – Meissner effect - Types of Superconductors – Applications of Superconductors - Dielectric Breakdown – Properties of Different Types of Insulating Materials.

Books for Study:

1. Material Science – M.Arumugam – Anuradha Publishers.

Books for Reference:

1. Introduction to Solid State Physics – Kittel – Wiley and Sons
2. Material Science and Engineering – V. Raghavan – PHI
3. Introduction to Solids – Azaroff – TMH.