

FPYC-603 SOLID STATE PHYSICS

Unit-I

Crystal structure: Types of lattices, unit cell, Wigner Seitz cell, simple cubic (SC), Body centered cubic (BCC), face centered cubic (FCC), hexagonal closed packed (HCP) and miller indices, elementary idea about symmetry elements.

Crystal diffraction: Crystal structure, determination of diffraction of x-rays, electrons and neutrons, Bragg's law, reciprocal lattice, Brilluoin zones, Laue's derivation, atomic form factor and geometrical structure factor.

Unit II

Crystal Binding: Inert gas crystals, vander waals- London interaction, Repulsive interaction, cohesive energy, ionic crystals, electrostatic energy, Evaluation of Madelung constant, Covalent binding, metallic binding, Hydrogen bonded crystals.

Conduction in metals: Drude's theory of electrical conduction, thermal conductivity of metals, density of states and Fermi- Dirac distribution of electron gas, heat capacity of electron gas.

Unit III

Lattice Vibrations: Elastic and Atomic force constants, Dynamics of chains of atoms, monoatomic and diatomic chains, optical and acoustic modes, interaction of light with ionic crystals.

UNIT-IV

Superconductivity: experimental survey, Zero resistivity, Meissner's effect, Type-I and Type-II superconductors, specific heat and thermal conductivity.

References

1. Introduction to Solid State Physics- Kittel
2. Solid State Physics- Omar
3. Solid State Physics-Srivastava