16 MPYC-203(BASIC CONDENSED MATTER PHYSICS)

MARKS-100

Unit-I

Crystallography:-

Crystal lattice, crystal structure, symmetry elements in crystal, proper rotation axis,plane of symmetry, inversion center, screw axis, glide plane, types of bravais lattices, crystal structure: simple cubic, body centre cubic face centred cubic, HCP structure, Diamond structure,Zinc blende structure, Fluorite structure ,perovskite structure,,Weigner –Seitz cell, Miller indices, Liquid crystals, quasi crystals, carbon clusters, carbon nano tubes.

Phonons and lattice vibrations Vibrations of monoatomic and diatomic lattices,dispersion,optics& acoustic modes,quantum of lattice vibrations and phonon momentum,Inelastic scat-

tering of neutron and photons by phonons. Thermal properties of insulators Lattice heat capacity,debye& Einstein model,Anharmonic Crystal interactions,Thermal conductivity & thermal expansion.(12)

Unit-II:

Free electron Fermi gas:

Density of state in one dimention,effect of temperature on Fermi-Dirac distribution,Free electron gas in three dimentions,heat capacity of electron gas,electrical and thermal conductivity of metals.

Band theory:

Electrons in periodic potential,Blochstheorem,Kronig Penney model,origin of band gap,

Unit-III:

Superconductivity:

Experimental survey,Meisnerseffect,Type-I & Type-II superconductors,Thermodynamics of superconductors,Londonstheory,Josephsonseffect,Basic concepts of cooper pairing in BCS theory,Ginz-Landau Theory,flux quantization,applications of superconductors.

BOOKS:

1. Introduction to solid state physics C. Kittel
2. Solid state physics Ashcroft and Mermin 3. Principles of Condensed Matter physics P.M. Chaikin and T.C. Lubensky
4. Solid state physics A.J. Dekker
5. Solid state physics O.E. Animaler
6. Quantum Theory Solid State J.Callaway
7. Solid state physics C.G. Kuper
8. Solid state physics David W. Snoke (LPE Publication)
9. Solid state physics Dan Wei (Cengauge Learning)