Subject Code : RN2I3

SEMESTER II – PAPER III – SOLID STATE PHYSICS

UNIT I – CRYSTALLOGRAPHY & DIFFRACTION

Lattices – Crystal planes – diffraction theory – Atomic form factor – structure factor – experimental methods: Debye Scherrer method, Laue method – Quasi crystals – Atomic cluster – Carbon 60.

UNIT II – FREE ELECTRON THEORY OF METALS

Properties of metals – free electron gas – Boltzmann equation – Sommerfeld theory of electrical conductivity – Wiedmann Franz law – Hall effect definition, mobility, Hall angle – experimental determination.

UNIT III – BAND THEORY OF SOLIDS

Introduction – energy spectra in atoms, molecules and solids – Bloch theorem – Kroni Penny model – Velocity of an electron in periodic potential – effective mass – acceleration of the electron moving in periodic lattice – holes.

UNIT IV – MAGNETIC RESONANCE

NMR – Determination by nuclear induction method – spectrum of methyl alcohol – ESR – experimental method – Mossbauer effect: resonant absorption, theory, experimental method, importance.

UNIT V – APPLICATIONS

Amorphous semiconductors: band structure, electronic conduction – optical absorption. – Liquid crystals: Classification, orientational order, and intermolecular forces. Polymers – Chemical applications of Mossbauer effect, ESR – nuclear acids – solid-state methods to proteins.

TEXT BOOKS FOR STUDY

1. Solid State Physics – Gupta & Kumar 8th reprint – 1998-K.Nath & Co, Meerut – Chapters 5,7,8,9,13,15 for Units 2,3,4
2. Elementary Solid State Physics Principles and Applications – M.Ali Omar 2000-Addison Wesly Publishing Company – Chapters 12 & 13 for Unit 5
3. Introductory Solid State Physics – II edition – H.P.Myers –1998- Viva Books Pvt. Ltd. Chapters 2 & 3 for Unit 1.

BOOKS FOR REFERENCE:

1. Solid State Physics, S.O.Pillai – Wiley Eastern Ltd., New Age International Ltd. (1998)
2. Solid State Physics C.M.Kachhava -Tata McGraw Hill Company New Delhi 1990.