

Course-IV: SOLID STATE PHYSICS & ELECTRONIC DEVICES

Block-1

Bloch theorem, Bloch functions, periodic potentials, Reciprocal lattice, periodic boundary conditions, Brillouin zones, Free electron approximation application to square and cubic lattices, Constant energy surfaces, Fermi surfaces, Brillouin zones in square lattice.

Block-2

Boltzmann transport equation, Sommerfeld's theory of electrical conductivity, Dependence of resistivity on temperature and impurities, Matthiessens rule, Electron-photon collisions

Electrical conductivity of metals at high frequencies, Hall Effect and magneto resistance in metals, Elemental and compound semiconductors

Block-3

Luminescence; Decay mechanisms, Semiconductors, Semiconductor devices
Diffusion capacitance, JFET, SCR and UJT

References:

1. Dekker A.J, - Solid State Physics; 2nd edition, Macmillan & Co Ltd, London, 1985.
2. McKinley J P, - Solid State and Semiconductor Physics; 1st edition, Harper and Row, USA, 1966.
3. Roy D.K, - Physics of Semiconductor Devices; 2nd edition, University Press, Hyderabad, 1992.
4. Schurz M, - Physics of Semiconductor Devices, 1st edition, Prentice-Hall of India, New Delhi, 1999.
5. Wilson J. And Hawkes J.F.B, - Optoelectronics: an introduction; 2nd edition, Prentice-Hall of India, New Delhi, 1996.
6. Streetman B and Banerjee S, - Solid State Electronic Devices; 7th edition, Pearson, New

York, 2015.

7. Omar M.A, - Elementary Solid State Physics, Addison Wesley, New Delhi, 2000.
8. Wahab M.A, - Solid State Physics; 3rd edition, Narosa Publishing House, New Delhi, 2015.