

Material Science & Engineering

EC802B

Contacts: 3L

Credits: 3

Structure of Solids : Atoms and their binding, Bonds, Crystal Systems, Bravais Lattice, Miller Indices, Crystalline, Polycrystalline and Amorphous Materials; Metals, Semiconductors and Insulators, Lattice defects- Qualitative ideas of point, line, surface and volume defects. [5]

Dielectric Properties : Dielectric Polarization and Mechanism- Internal or local field, Dielectric Loss, Temperature and Frequency dependence of dielectric constant, Elementary ideas of Piezoelectrics, Ferroelectrics and Pyroelectric Materials and its Applications. [4]

Magnetic Properties : Elementary ideas of classification of magnetic materials – Diamagnetism, Paramagnetism, Ferromagnetism, Ferrimagnetism, Magnetic Domains. [2]

Superconductors : Basic concepts of superconductivity, Transition temperature, Meissner effect, High-T_c superconductors, Hard and Soft Materials, SQUID. [3]

Optical properties : Absorption, Emission, Luminescence, Electro-optic and Acousto-optic effects, Photorefractive effects. [3]

Materials for Optical Communication : LED and Laser Materials, Optical Fibre. [3]

Materials for Data Storage : Magnetic Cores, Tapes, Disks, Hard disk, Floppy disk, Magneto-optic devices, Bubble memories, Magnetoelectronic Materials, CD, DVD, CCD. [5]

Materials for Display Devices : CRT, LED, LCD, TFT, Plasma Display. [3]

Advanced Materials : Metallic Glasses, Nanomaterials, etc. [2]

Books:

1. Electrical Engineering Materials – A. J. Dekker (PHI)
2. Material Science and Engineering—A First Course – V. Raghavan (PHI Learning Pvt. Ltd)
3. Principles of Electronic Materials and Devices – S. Kasap (McGraw-Hill)
4. An Introduction to Solid State Physics - Charles Kittel (John Wiley & sons)
5. An Introduction to Electronic Materials for Engineers – W. Kao, Z. Lee and N. Sannes (World Scientific)