PMT3D001 PHYSICS OF MATERIALS (HONOURS)

Module I (13Hours)

Crystallography: Crystalline and amorphous structures, Elements of crystal symmetry, symmetry elementsand axes, two, three, four and six fold symmetry, review of atomic bonding. Order-disorder transformations:Ordering, Degrees of long range and short range ordering, Anti phase domain, super lattice, Elements of superlattice theories, properties and applications.

Module II (13 Hours)

Electron theory of Metals: Heisenberg's uncertainty principle, Schrodinger's equation, free electron theory,Zone theory, Density of states, Fermi energy level, Application of zone theory to alloy phases; Conductorsand insulators, semi conductors, P- and N- type semi conductors. Optical properties, Refraction, Absorption,Absorption in dielectrics, photographic images, Luminescence, Lasers.

Module III (14 Hours)

Magnetic Properties: Dia, Para and Ferro- magnetism, Domain theory of Ferro magnetism, Antiferromagnetism and Ferrites, Hysteresis loop, soft magnetic materials, Hard magnetic Materials, Superconductivity, BCS theory, Type- I and Type- II super conductors. Thermoelectric properties of metals andsemiconductors, ionic and superionic conductivity in solids. Different types of dielectric materials, ferro,antiferro and ferri-electric materials. Piezo electric materials.

Books for Reference:

1. *Reed Hill R.E., Physical Metallurgy Principles, Affiliated East West.*
2. *Kakani S.L. and Kakani A., Materials Science, New Age International.*
3. *Higgins R.A., Engineering Metallurgy, Standard Publishers.*
4. *Raghavan V., Materials Science and Engineering, PHI.*
5. *Mauraka S.P. and Peckrar M.C., Electronic Materials Science and Technology, Academic Press.*
6. *Rose-innes A.C. and Rhoderick E.H., Introduction to Superconductivity, Pergamon press, Oxford.*
7. *Srivastava C.M. and Srinivasan C., Science of Engineering Materials, New Age Pub., New Delhi.*
8. *Kittel C., Introduction to Solid State Physics, John Wiley.*
9. *Streetman B.G., Solid State Electronic Devices, Prentice Hall, New Delhi.*
10. *Goldman A., Van Nostrand, Modern Ferrite Technology, New York.*