

APPLIED PHYSICS

L-T-P-C

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Course Objectives

- To enhance student's knowledge of theoretical and modern technological aspects in physics and to introduce fundamentals of physics relevant to engineering applications
- To introduce advances in technology for engineering applications

Course Outcomes

By the end of the course, student will be able to:

1	Find the different magnetic and super conducting materials to enhance the performance of machines.
2	Identify and improve the dielectric materials for insulating, mechanical and communication applications
3	Synthesize and characterize nano phase materials for industrial applications.
4	Understand the basic crystalline structure and its relation to the properties of the materials.
5	Design various semiconductor devices for engineering applications.

SYLLABUS

UNIT – I
periods

12

Magnetic materials: Definition of magnetic permeability, magnetization and magnetic susceptibility, origin of magnetic moment, classification of magnetic materials, properties of diamagnetic and paramagnetic materials, ferromagnetic materials - hysteresis curve , domain theory of ferromagnetism, soft and hard ferromagnetic materials, anti-ferromagnetic and ferrimagnetic materials , ferrites and its applications

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

Superconductivity: Introduction, properties of superconductors, effect of temperature and magnetic field, Meissner effect, flux quantization, type – I and type – II superconductors , high temperature superconductors, applications of superconductors, BCS theory (qualitative)

A text book of engineering physics- M.N.Avadhanulu & P.G.Kshirasagar, S.Chand Publication

UNIT–II
periods

10

Dielectric materials: Definition of electric dipole moment, dielectric polarization and dielectric constant, types of polarization – electronic, ionic and oriental polarization, expression for polarisability, internal fields in solids, Classius – Mossotti equation, frequency dependence of electronic polarization ,properties of ferroelectric materials and their applications

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

UNIT-III
periods

10

Nanophase materials: Introduction to nanophase materials, properties of nanophase materials, synthesis of nanophase materials – chemical vapour deposition, sol-gel method, mechanical attrition method, applications of nanophase materials

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

Techniques for characterization of materials: Principles of x-ray florescence – X-ray Diffraction– Electron microscopy (SEM and TEM).

Engineering Physics – A.Marikani, PHI Learning Private Limited

UNIT-IV
periods

10

Crystal structure: Introduction, fundamental terms of crystallography – space lattice, , crystal lattice, unit cell, planes, seven crystal systems – Bravias lattices, cubic lattices, crystal directions and planes, Miller indices, interplanar spacing and interatomic distance , some simple crystal structures, body-centered cubic crystals, face-centered cubic crystals

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

UNIT-V

12 periods

Semiconductor Physics: Intrinsic and extrinsic semiconductors, Fermi level, carrier concentration in intrinsic semiconductor, continuity equation, direct and indirect band gap semiconductors. Lorentz force, Hall Effect and its applications.

Physics of semiconductor devices: open circuited p-n junction diode, energy diagram of p-n diode, working of a diode, volt-ampere characteristics of p-n junction, diode as a rectifier, light emitting diode (LED), liquid crystal display (LCD), photodiode

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

REFERENCE BOOKS:

- 1) Engineering physics - V.Rajendran Tata McGraw Hill Education Private Limited
- 2) Engineering Physics – Dattu Ramanlal Joshi Tata McGraw Hill Education Private Limited
- 3) Engineering Physics – A.Marikani PHI Learning Private Limited
- 4) Engineering Physics – D.K.Bhattacharya, Poonam Tandon Oxford University Press