Syllabus

PANJAB UNIVERSITY, CHANDIGARH

B.Sc. Sem. VI

Paper A : CONDENSED MATTER PHYSICS–II **(30 Hrs.)**

UNIT–I

Lattice Dynamics : Lattice vibrations and phonons, Scattering of photons by phonons, Dynamics of a linear chain of similar atoms and chain of two types of atoms, optical and acoustic modes, Density of modes, Einstein and Debye theories of specific heats of solids.

Magnetic classification of materials (Dia, para, ferro, ferri, antiferro), Langevin theory of dia and paramagnetism, Quantum theory, Weiss's theory of Ferromagnetism, temperature dependence, hysteresis of ferromagnetic materials.

UNIT–II

Dielectric constant & polarizability, electric susceptibility, Clausium Mosotti equation, frequency dependence, ferroelectrics and Piezoelectrics.

Liquid crystals, various types and properties, Applications.

Superconductivity : Meisner effect, London's equation and penetration depth, critical magnetic field and temperature, DC and AC Josephson effect, BCS theory (formation of cooper pairs), ground state and energy gap.

Basic ideas of materials at nanoscale : Difference from bulk material properties, Nanoparticles, introduction to fabrication and characterization techniques, Carbon Nanostructures–nanotubes, grapheme Applications of nanotechnology in various fields.