CURRICULUM PLAN 2022-2023
Even Semester: V, III, I
Dr. Rashmi Menon
Dept. of Physics

B.Sc.(H)-IIIrd year

Name of Paper and Code	Allocation of Lectures	Month-wise Schedule followed by the department
CC-XII: Solid State Physics (32221502) -60 Periods		
Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis. Types of Lattices. Unit Cell, Symmetry and Symmetry Elements. Miller Indices. Reciprocal Lattice. Brillouin Zones. Diffraction of X-rays: single crystal and powder method. Bragg's Law, Laue Condition. Ewalds' construction. Atomic and Geometrical Factor. Simple numerical problem on SC, BCC, FCC.	14	21-July to 13-Aug
Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T3law.	10	18-Aug to 2-Sept
Electrons in Solids: Electrons in metals- Introduction to Drude Model, Density of states (1-D, 2-D, 3-D) (basic idea), Elementary band theory: Kronig Penney model. Band Gap, direct and indirect bandgap. Effective mass, mobility, Hall Effect (Metal and Semiconductor).	10	3-Sept to 17-Sept
Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia– and Para- magnetism.	9	22-Sept to 6-Oct

Hunds's rule. Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Curie's law. B-H Curve. soft and hard material and Energy Loss Hysteresis.		
Dielectric Properties of Materials: Polarization. Local Electric Field in solids. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mossotti Equation. Classical Theory of Electric Polarizability. AC polarizability, Normal and Anomalous Dispersion. Complex Dielectric Constant. Langevin-Debye equation.	9	13-Oct to 27-Oct
Introduction to basics of phase transitions: Landau theory for ferromagnetic materials (No derivation).	3	28-Oct to 3-Nov
Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation).	5	4 Nov to 12-Nov