

B. Sc. (Physical Sciences) VI Semester

Paper - Solid State Physics

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January 18, 2024- May 12, 2024

S.No	Date	Units and Topics	Lectures
I	Jan 18 – Jan 27	Unit 1: Superconductivity <ul style="list-style-type: none">• Superconductivity• Experimental Results• Meissner Effect• Type I and Type II superconductors Unit 2 : Magnetism <ul style="list-style-type: none">• Introduction to magnetism• Magnetic properties• Classification between dia, para, ferro and ferromagnetic materials	5
II	Jan 29 – Feb 10	<ul style="list-style-type: none">• Classical Langevin Theory of diamagnetism• Classical Langevin Theory of Paramagnetism• Quantum theory of paramagnetism, Curie's Law• Introduction to ferromagnetic domains• Weiss theory of ferromagnetism• B-H curve and Hysteresis,• Energy loss and Applications	8
III	Feb 12 – Feb 24	<u>Unit – 3 Dielectric properties of materials</u> <ul style="list-style-type: none">• Introduction to dielectric properties (Electric susceptibility, polarizability, depolarization field)• Local electric field at an atom• Clausius Mosotti equation and its significance• Classical theory of Electric polarizability• Normal and anomalous dispersion	8
IV	Feb 26 – Mar 09	<u>Unit – 4 Free electron theory</u> <ul style="list-style-type: none">• Drude Model• Introduction to band theory and Band diagram of solids• Bloch theorem	8

		<ul style="list-style-type: none"> • Kronig- Penney model, • Kronig- Penney model (<i>continued</i>) • Distinction between conductors, insulators and Semiconductors on the basis of Energy bands 	
V	Mar 11 –March 23	<ul style="list-style-type: none"> • P and N type Semiconductors • Semiconductors (Conductivity and Mobility) • Hall effect and Hall coefficients • Questions and Doubts clarification • Internal Assessment (Class Assignment) 	8
Mid semester break: March 24, 2024 – March 31, 2024			
VII	April 01 – April 13	<ul style="list-style-type: none"> • Introduction to Lattice vibrations and phonons • Linear Monoatomic chain • Linear Diatomic Chains • Acoustical and Optical Phonons. • Dulong and Petit’s Law, 	8
VIII	April 15- April 27	<ul style="list-style-type: none"> • Einstein theory of specific heat of solids • Debye theory of specific heat of solids • Debye T^3 law • Limitations of Debye Model • Amorphous and Crystalline Materials. • Lattice Translation Vectors • Unit Cell. 	8
IX	April 29- May 11	<ul style="list-style-type: none"> • Types of lattices. • Reciprocal Lattice. • Diffraction of X-rays by Crystals. • Bragg’s Law 	6