

Syllabus completion Report

T.Y.B.Sc. Physics (Sem VI)

Year: 2022-2023

PHY-361: Solid State Physics

Teacher: A.B.Kanawade

Chapter No.	Month	Contents	Remarks
1	15/02/2023 to 14/03/2023	1: The Crystalline Structures (10 L) Lattice, Basis, Translational Vectors, Primitive Unit Cell, Symmetry Operations, Different types of lattices: 2D and 3D (Bravais lattices) Miller indices, Inter Planer Distances, SC, BCC and FCC structures, Packing Fraction, Crystal structures NaCl, diamond, CsCl, ZnS, HCP, Concept of Reciprocal Lattice and its properties, Problems	
2	15/03/2023 to 27/03 2023	2: X ray Diffraction and Experimental Methods (9 L) Bragg's Diffraction, Bragg's Law, Experimental X-ray diffraction Methods: The Laue Method, Bragg's Spectrometer, The Powder Crystal Method, Analysis of cubic structure by Powder Method, Ewald's Construction, Bragg's Diffraction condition in direct and reciprocal lattice, Problems	
3	01/05/2023 to 14/05/2023	3: Free Electron and Band Theory of Metals (9L) Assumptions of Classical and Somerfield Free Electron model, Energy levels and Density of States (One and Three Dimensions), Nearly free electron model, Fermi energy, Fermi level, Hall Effect, Mobility, Hall Angle Band Theory of Solids: Origin of energy gap, Energy bands in Solids, Distinction between metal, semiconductor and insulator, Problems	
4	14/05/2023 to 19/05/2023	4: Magnetism (8L) Diamagnetism, Langevin theory of Diamagnetism, Paramagnetism, Langevin theory of Paramagnetism, Ferromagnetism, Antiferromagnetism, Ferromagnetic Domains, Hysteresis, Curie temperature, Neel temperature, Superconductivity, Problems	

The syllabus of the course has been completed as per the schedule.

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T.Y.B.Sc. Physics (Sem VI)
PHY-362: Quantum Mechanics

Year: 2022-2023
Teacher: A.B.Kanawade

Chapter No.	Month	Contents	Remarks
1	28/03/2023 to 10/04/2023	Origin of Quantum Mechanics: (08 L) 1. Historical Background: Review of Black body radiation, photoelectric effect 2. Matter waves - De Broglie hypothesis. Davisson and Germer experiment. 3. Wave particle duality 4. Concept of wave function, wave packet, phase velocity, group velocity and relation between them 5. Heisenberg's uncertainty principle with Electron diffraction experiment, different forms of uncertainty. Problems	
2	10/04/2023 to 23/04/2023	The Schrodinger equation: (10 L) 1. Physical interpretation of Wave function 2. Schrodinger time dependent equation. 3. Schrodinger time independent equation (Steady state equation). 4. Requirements of wave function. 5. Probability current density, equation of continuity and its physical significance. 6. An operator in Quantum mechanics. - Eigen function and Eigen values. 7. Expectation value – Ehrenfest's theorem(omly statements), Problems	
3	24/04/2023 to 10/05/2023	Applications of Schrodinger Steady state equation: (14 L) 1. Free particle. 2. Step Potential 3. Potential barrier(Qualitative discussion), 4. Barrier potential and tunneling effect. 5. Particle in infinitely deep potential well (one - dimension). 6. Schroedinger equation in spherical polar coordinate system 7. Rigid rotator (Free axis) 8. Problems	
5	16/05/2023 to 18/05/2023	Operators in Quantum Mechanics: (04 L) 1. Hermitian operator. 2. Position, Momentum operator, angular momentum operator, and total energy operator (Hamiltonian). 3. Commutator brackets- Simultaneous Eigen functions. 4. Commutator algebra. 5. Commutator brackets using position, momentum and angular momentum operator. 6. Concept of parity according to quantum mechanics, parity operator and its Eigen values. 7. Applications of operators in quantum mechanics 8. Problems	

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Syllabus completion Report

S.Y.B.Sc. Physics (Sem IV)
PHY-242: Optics

Year: 2022-2023
Teacher: A.B.Kanawade

Chapter No.	Month	Contents	Remarks
1	11/03/2023 to 29/03/2023	1. Geometrical optics: (08L) 1.1 Introduction to lenses and sign conventions. 1.2 Thin lenses: Lens equation for convex lens 1.3 Lens maker equation 1.4 Concept of magnification, deviation and power of a thin lens 1.5 Equivalent focal length of two thin lenses 1.6 Concept of cardinal points 1.7 Problems	
2	31/03/2023 to 28/04/2023	2. Lens Aberrations: (08L) 2.1 Introduction 2.2 Types of aberrations: Monochromatic and Chromatic 2.3 Types of Monochromatic Aberrations and their Reductions 2.4 Types of Chromatic Aberrations 2.5 Achromatism: Lenses in Contact and Separated by a finite Distance 2.6 Problems	
3	06/05/2023 to 10/05/2023	3. Optical Instruments: (06L) 3.1 Introduction 3.2 Simple Microscope 3.3 Compound Microscope 3.4 Ramsden's eye piece 3.5 Huygens eye piece 3.6 Problems.	
4	11/05/2023 to 16/05/2023	4. Interference and Diffraction: (08L) 4.1 Introduction 4.2 Phase change on reflection (Stokes treatment) 4.3 Interference due to Wedge shaped thin film 4.4 Newton's ring 4.5 Diffraction Types: Fresnel's Diffraction and Fraunhofer's Diffraction 4.6 Fraunhofer's diffraction at a single slit 4.7 Plane Diffraction grating , Rayleigh criterion for resolution 4.8 Problems	
5	16/05/2023 to 19/05/2023	4. Polarization: (6L) 5.1 Introduction to polarization 5.2 Brewster's law 5.3 Law of Malus 5.4 Polarization by double refraction 5.5 Nicol Prism 5.6 Problems	

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