Teaching Plan Session (2021-22)

Class- B.Sc 2   Teacher Name-Balwinder Kaur   Subject-Physics

Period No. 3   Name of Paper -Quantum Mechanics and Optics and lasers

Sr. No.	Date	Topics to be covered
1.	01/09/2021-20/09/2021	Formalism of Wave Mechanics: Brief introduction to need and development of quantum mechanics, Wave-particle duality, de-Broglie hypothesis, Complimentarity and uncertainty principle, Gaussian wave-packet, Schrodinger equation *for* a free particle, operator correspondence and equa1ion for a particle subject to forces. Normalization and probability
2.	21/09/2021-10/10/2021	Interpretation of wave function, Super position principle, Expectation value, probability current and conservation of probability, Admissibility conditions on the wave function. Ehrenfest theorem, Fundamental postulates of wave mechanics, Eigen functions and eigen values. Operator formalism, Orthogonal systems, Expansion in eigen functions, Hermitian operators. Simultaneous eigen functions. Equation of motion.
3.	11/10/2021-30/10/2021	Problems in one and three dimensions: Time dependent Schrodinger equation. Application to stationary states for one dimension, Potential step, Potential barrier, Rectangular potential well, Degeneracy, Orthogonality, Linear harmonic oscillator, Schrodinger equation for spherically symmetric potential, Spherical harmonics. Hydrogen atom energy levels and eigen functions. Degeneracy, Angular momentum.
4.	01/11/2021-14/11/2021	Diffraction: Huygens-Fresnel theory, half-period zones, Zone plates, Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at rectangular and circular apertures, Effects of diffraction in optical imaging, resolving power of telescope. The diffraction grating, its use as a spectroscopic element and its resolving power.
5.	15/11/2021-20/11/2021	MST Exams
6.	21/11/2021-5/12/2021	Polarization: Concept and analytical treatment of un-polarized, plane polarized and elliptically polarized light. Double refraction, Nicol prism, Sheet polarizer, Retardation plates, Production and analysis of polarized light (quarter and

		half wave plates).
7.	28/01/2022-15/02/2022	One Electron Atomic Spectra: Excitation of atom with radiation. Transition probability, Spontaneous transition, Selection rules and life time, Spectrum of hydrogen atom. Frank Hertz Experiment, Line structure, Normal Zeeman effect,
8.	16/02/2022-01/03/2022	Electron spin, Stern Gerlach experiment, Spin orbit coupling (electron magnetic moment, total angular momentum),Hyperfine structure, Examples of one electron systems, Anomalous.Zeeman effect, Lande-g factor (sodium D-lines).
9.	02/03/2022-15/03/2022	,Many Electron System Spectra: Exchange symmetry of wave functions, exclusion principle, Shells, Sub shells in atoms, atomic spectra (Helium), L.S. coupling, Selection rules, Regularities in atomic spectra, Interaction energy, X-ray spectra,
10.	16/03/2022-28/03/2022	Mosley law, Absorption spectra, Auger effect. Molecular bonding, Molecular spectra, Selection rules, Symmetric structures, Rotational, vibrational electronic level and spectra of molecules, Raman spectra.
11.	29/03/2022-03/04/2022	MST Exams
12.	04/04/2022-25/04/2022	Laser Systems : types of lasers, Ruby and Nd: YAG lasers, He-Ne and CO_2 lasers-construction, mode of creating population inversion and output characterstics. Semiconductor lasers, Dye lasers, a-switching, Mode locking, Applications of lasers-a general outline. Basics of holography.