Govt. College, Alewa (Jind)

Session: 2023-2024 (B.Sc 3rd Year)
Lesson Plan (Odd Sem)

Name of the Teacher:Dr MANJEET SINGH , ASSISTANT PROFESSOR
Subject: PHYSICS (Theory) Class: B. Sc. 5thSem.
Physics Paper: I(Quantum and Laser Physics)
Paper's Code: NPH05(I)
Max. Marks: 50(External Assessment: 40 Marks, Internal Assessment: 10 Marks)
Contact Hours Per Week: 5
PhysicsPaper:II(Nuclear Physics)
Paper's Code: NPH05(II)
Max. Marks: 50(External Assessment: 40 Marks, Internal Assessment: 10 Marks)
Contact Hours Per Week: 5

Sr. No.	Week	Topic
1	24-07-2023 to 29-07-2023	Overview, scale of quantum physics, boundary between classical and quantum phenomena, Photon, Photoelectric effect,
2	31-07-2023 to 05-08-2023	Compton effect (theory and result), Frank-Hertz experiment, de-Broglie hypothesis. Davisson and Germer experiment, G.P.Thomson experiment. Phase velocity, group velocity and their relation. Heisenberg's uncertainty principle.
3	07-08-2023 to 12-08-2023	Time energy and angular momentum, position uncertainty. Uncertainty principle from de Broglie wave. (Wave-particle duality). Gamma Ray Microscope, Electron diffraction from a slit. Derivation of 1-D time-dependent Schrodinger wave equation (subject to force, free particle).
4	14-08-2023 to 19-08-2023	Time-independent Schrodinger wave equation, eigen values, eigen functions, wave functions and its significance. Orthogonality and Normalization of function, concept of observer and operator. Expectation values of dynamical quantities, probability current density
5	21-08-2023 to 26-08-2023	(i)Free particle in one-dimensional box (solution of Schrodinger wave equation,eigen functions, eigen values, quantization of energy and momentum, nodes and anti nodes, zero point energy). (ii) One dimensional step potential E > Vo (Reflection and Transmission coefficient) (iii) One dimensional step potential E < Vo (penetration depth calculation).
6	28-08-2023 to 02-09-2023	(iv) One dimensional potential barrier, E > Vo (Reflection and Transmission coefficient) (v) One-dimensional potential barrier, E < Vo (penetration or tunneling coefficient).
7	04-09-2023 to 09-09-2023	(vi) Solution of Schrodinger equation for harmonic oscillator (quantization of energy, Zero-point energy, wave equation for ground state and excited states). Absorption and emission of radiation
8	11-09-2023 to 16-09-2023	Main features of a laser: Directionality, high intensity, high degree of coherence, spatial and temporal coherence,

9	18-09-2023 to 23-09-2023	Einstein's coefficients and possibility of amplification, momentum transfer, life time of a level,
10	25-09-2023 to 30-09-2023	kinetics of optical absorption ((two and three level rate equation, Fuchbauer landerburg formula).population inversion: A necessary condition for light amplification, resonance cavity, laser pumping, Threshold condition for laser emission, line broadening mechanism, homogeneous and inhomogeneous line broadening (natural, collision and Doppler broadening).
11	02-10-2023 to 07-10-2023	He-Ne laser and RUBY laser (Principle, Construction and working), Optical properties of semiconductor, Semiconductor laser (Principle, Construction and working), Applications of lasers in the field of medicine and industry
12	09-10-2023 to 14-10-2023	, Nuclear composition (p-e and p-n hypotheses), Nuclear properties; Nuclear size, spin, parity, statistics, magnetic dipole moment, quadruple moment (shape concept). Class test
13	16-10-2023 to 21-10-2023	Determination of mass by Bain-Bridge, Bain-Bridge and Jordan mass spectrograph. Determination of charge by Mosley Law. Determination of size of nuclei by Rutherford Back Scattering. mass and binding energy, systematic of nuclear binding energy, nuclear stability
14	23-10-2023 to 28-10-2023	Alpha-disintegration and its theory. Energetics of alpha-decay, Origin of continuous beta spectrum (neutrino hypothesis), types of beta-decay and energetics of beta-decay. Nature of gamma rays, Energetics of gamma rays.
15	30-10-2023 to 04-11-2023	Interaction of heavy charged particles (Alpha particles); Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Range and straggling of alpha particles.Geiger-Nuttal law. Interaction of light charged particle (Beta-particle), Energy loss of beta-particles (ionization),
16	06-11-2023 to 09-11-2023	Range of electrons, absorption of beta-particles. Interaction ofGamma Ray; Passage of Gamma radiations through matter (Photoelectric, Compton andpair production effect) electron-positron annihilation. Class test
17	10-11-2023 to 16-11-2023	**University Vacations (Diwali)**
18	17-11-2023 to 18-11-2023	Absorption of Gamma rays (Mass attenuation coefficient) and its application. Linear accelerator, Tandem accelerator, Cyclotron and Betatron accelerators.
19	20-11-2023 to 25-11-2023	Gas filled counters; Ionization chamber, proportional counter, G.M. Counter (detailed study), Scintillation counter and semiconductor detector.
20	27-11-2023 to 02-12-2023	Nuclear reactions, Elastic scattering, Inelastic scattering, Nuclear disintegration, Photonuclear reaction, Radiative capture, Direct reaction, Heavy ion reactions and spallation Reactions. Conservation laws.
21	04-12-2023 to 09-12-2023	Q-value and reaction threshold**,** Nuclear Reactors, General aspects of Reactor Design, Nuclear fission and fusion reactors,(Principle, construction, working and use). Class Test
22	11-12-2023 to 16-12-2023	Revision