Lesson Plan

Session : 2026 -27 Odd Semester

Name : Jyoti Sangwan

Class : B.Sc. 5th Semester (L.S.) Subject: Physics

Paper : Nanotechnology

Paper Code : 26PHY405MV01

Month	Topic
August	Unit 1: Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale,Size Effects in nano systems, Quantum confinement: Applications of Schrodinger equationInfinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructures and its consequences.
September	Unit 2: Top down and Bottom-up approach, Photolithography. Ball milling, Gas phase condensation, Vacuum deposition, Physical vapor deposition (PVD): Thermal evaporation, E-beam evaporation, Pulsed Laser deposition, Chemical vapor deposition (CVD), Sol-Gel. Electro deposition, MBE growth of quantum dots.
October	Unit 3: X-Ray Diffraction, FTIR, UV Visible, Optical Microscopy. Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy.
November	Unit 4: Applications of nanoparticles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells), CNT based transistors. Nanomaterial Devices: Quantum dots heterostructure lasers, optical data storage, Magnetic quantum well; magnetic dots -magnetic data storage, Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems(NEMS).

Lesson Plan

Session -2026-27 Odd semester

Name – Jyoti Sangwan

Subject – Physics

Class-B.Sc. 5th Sem (Math H')

Paper- Environmental Physics

Paper code- 25PHYS404MV01

Month	Topics
August	Unit 1: Structure and thermodynamics of the atmosphere, Composition of air, Greenhouse effect Transport of matter, energy and momentum in nature, Stratification and stability of atmosphere. Laws of motion, hydrostatic equilibrium, General circulation of the tropics, Elements of weather and climate of India.
September	Unit 2: Physics of radiation, Interaction of light with matter, Rayleigh and Mie scattering, Laws of radiation (Kirchoffs law, Planck's law, Wien's displacement law, etc.), Solar and terrestrial spectra, UV radiation, Ozone depletion problem, IR absorption energy, balance of the earth atmosphere system.
October	Unit 3: Elementary fluid dynamics, Diffusion, turbulence and turbulent diffusion, Factors governing air, water and noise pollution, Air and water quality standards, Waste disposal, Heat island effect, Land and see breeze, Puffs and plumes, Gaseous and particulate matters, Wet and dry deposition.
November	Unit 4: Energy source and combustion processes, Renewable sources of energy, Solar energy, wind energy, bioenergy, hydropower, fuel cells, nuclear energy, Forestry and bioenergy, Elements of weather and climate' Stability and vertical motion of air, Horizontal motion of air and water, Pressure gradient forces, Viscous forces, Inertia forces, Reynolds number, Enhanced Greenhouse Effect. Energy balance, a zero dimensional Greenhouse model, Global climate models.

Lesson Plan

Session : 2026 -27 Odd Semester

Name : Jyoti Sangwan

Class : B.Sc. 5th Semester (P.S.) **Subject:** Physics

Paper : Quantum Mechanics and Nuclear Physics

Paper Code : 26PHYM405DS01

Month	Topics
August	Unit–I Failure of Classical E.M. Theory, quantum theory of radiation (old quantum theory), Photon, photoelectric effect and Einstein's photoelectric equation Compton effect (theory and result). Franck-Hertz experiment. Inadequacy of old quantum theory, deBroglie hypothesis. Davisson and Germer experiment. Phase velocity group velocity,Heisenberg's uncertainty principle. Time-energy and angular momentum, position uncertainty. Uncertainty principle from de-Broglie wave, (wave-particle duality). Gamma Ray Microscope.
September	Unit–II Basic postulates and formalism: properties of Wave Function, Interpretation of Wave Function, Condition for physical acceptability of Wave Functions. Eigenvalues and Eigen functions, Probability current density, Expectation values of position and linear momentum. Time dependent and time independent Schrodinger equationconsideration of Schrodinger equation: Normalization, Orthogonality, Observables. Application of Schrodinger equation in the solution of the following one-dimensional problems: (i) Free particle in one dimensional box (solution of Schrodinger wave equation, eigen functions, eigen values, quantization of energy and momentum, nodes and antinodes, zero-point energy).
October	Unit–III Nuclear mass and binding energy, systematics nuclear binding energy, nuclear stability, nuclear size, spin, parity, statistics magnetic dipole moment, quadrupole moment (shape concept), Determination of charge by Mosley law Determination of size of nuclei by Rutherford Back Scattering. Interaction of heavy charged particles (Alpha particles), alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Energetics of alpha -decay, Range and straggling of alpha particles. Geiger-**Nuttal law.**
November	nit–IV Introduction of light charged particle (Beta-particle), Origin of continuous betaspectrum (neutrino hypothesis) types of beta decay and energetics of beta decay, Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles. Interaction of Gamma Ray, Nature of gamma rays, Energetics of gamma rays, passage of Gamma radiations through matter (photoelectric, Compton and pair production effect) electron position anhelation. Absorption of Gamma rays (Mass attenuation coefficient) and its application. Nuclear Reactors General aspects of Reactor design. Nuclear fission and fusion reactors (Principles, construction, working and use). Ionization chamber, proportional counter, G.M. counter detailed study