

Lesson Plan (2023-24)

Name:- Vijay kumar

Class:- B.Sc. 1st

Subject:- Physics

Semester:- 1st

Month	Topics
July	Mechanics of single and system of particles, conservation of laws of linear momentum, angular momentum and mechanical energy, Centre of mass and equation of motion, constrained motion, degrees of freedom, Generalised coordinates, displacement, velocity, acceleration, momentum, force and potential. Hamilton's variational principle, Lagrange's equation of motion from Hamilton's Principle. Linear Harmonic oscillator, simple pendulum, Atwood's machine
August	Rotation of Rigid body, moment of inertia, torque, angular momentum, kinetic energy of rotation. Theorems of perpendicular and parallel axes with proof. Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross-section. Acceleration of a body rolling down on an inclined plane, Mathematical Background : Scalars and Vectors, dot and cross product, Triple vector product, Scalar and Vector fields, Differentiation of a vector, Gradient of a scalar and its physical significance, Integration of a vector (line, surface and volume integral and their physical significance), Gauss's divergence theorem and Stokes theorem.
September	Electrostatic Field : Derivation of field E from potential as gradient, derivation of Laplace and Poisson equations. Electric flux, Gauss's Law and its application to spherical shell, uniformly charged infinite plane and uniformly charged straight wire, mechanical force of charged surface, Energy per unit volume. Magnetostatics : Magnetic Induction, magnetic flux, solenoidal nature of Vector field of induction. Properties of B (i) $\cdot B = 0$ (ii) $\times B = J$. Electronic theory of dia and para magnetism (Langevin's theory).
October- November	Domain theory of ferromagnetism. Cycle of Magnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance of Hysteresis curve Electromagnetic Theory : Maxwell equation and their derivations, Displacement Current. Vector and scalar potentials, boundary conditions at interface between two different media, Propagation of electromagnetic wave (Basic idea, no derivation). Poynting vector and Poynting theorem.

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Lesson Plan (2023-24)

Name:- Vijay kumar

Class:- B.Sc.2nd

Subject:- Physics

Semester:-3rd

Month	Topics
July	Computer Programming : Computer organisation, Binary representation, Algorithm development, flow charts and their interpretation. Fortran Preliminaries; Integer and floating point arithmetic expression, built in functions executable and non-executable statements, input and output statements, Formats, I.F. DO and GO TO statements, Dimension arrays statement function and function subprogram. Thermodynamics-I : Second law of thermodynamics, Carnot theorem, Absolute scale of temperature, Absolute Zero, Entropy, show that $dQ/T=0$, T-S diagram Nernst heat law, Joule's free expansion, Joule Thomson (Porous plug) experiment. Joule - Thomson effect. Liquefaction of gases. Air pollution due to internal combustion Engine
August	Thermodynamics-II : Derivation of Clausius - Claperyron latent heat equation. Phase diagram and triple point of a substance. Development of Maxwell thermodynamical relations. Application of Maxwell relations in the derivation of relations between entropy, specific heats and thermodynamic variables. Thermodynamic functions : Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them.
September	Fourier Analysis and Fourier Transforms : Speed of transverse waves on a uniform string. Speed of longitudinal waves in a fluid, superposition of waves (physical idea), Fourier Analysis of complex waves and its application for the solution of triangular and rectangular waves, half and full wave rectifier out puts. Fourier transforms and its properties. Application of fourier transform to following function. (I) (II) $f(x) = f(x) = e^{-x^2/2} I [x] a$
October- November	Geometrical Optics : Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses, Chromatic, spherical coma, astigmatism and distortion aberrations and their remedies. Physical Optics . Interference : Interference by Division of Wavefront : Fresnel's Biprism and its applications to determination of wave length of sodium light and thickness of a mica sheet, Lioyd's mirror, phase change on reflection.

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Lesson Plan (2023-24)

Name:- Vijay kumar

Class:- B.Sc.3rd

Subject:- Physics

Semester:-5th

Month	Topics
July	Crystalline and gallsy forms, liquid crystals. Crystal structure, periodicity, lattice and basis, crystal translational vectors and axes. Unit cell and primitive cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions. crystal planes and Miller indices, Interplaner spacing, Crystal structures of Zinc sulphide, Sodium Chloride and diamond, X-ray diffraction
August	Bragg's Law and experimental x-ray diffraction methods, K-space. Unit-III Reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c and f.c.c. Specific heat : Specific heat of solids, Einstein's theory of specific heat, Debye model of specific heat of solids.
September	Failure of (Classical) E.M. Theory. quantum theory of radiatio (old quantum theory), Photon, photoelectric effect and Einsteins photoelectric equation compton effect (theory and result). Inadequacy of old quantum theory, de-Broglie hypothesis. Davisson and Germer experiment. G.P. Thomson experiment. Phase velocity group velocity, Heisenberg's uncertainty principle. Time-energy and angular momentum, position uncertainty Uncertainty principle from de-Broglie wave, (wave-partice duality). Gamma Ray Maciroscope, Electron diffraction from a slit.
October- November	Derivation of time dependent Schrodinger wave equation, eigen values, eigen functions, wave functions and its significance. Normalization of wave function, concept of observable and operator. Solution of Schrodinger equation for harmomic oscillator ground states and excited states. Application of Schrodinger equation in the solution of the following one-dimensional problems : Free particle in one dimensional box (solution of schrodinger wave equation, eigen function, eigen values, quantization of energy and momentum, nodes and antinodes, zero point energy). i) One-dimensional potential barrie $E > V_0$ (Reflection and Transmission coefficient. ii) One-dimensional potential barrier, $E > V_0$ (Reflection Coefficient, penetration of leakage coefficient, penetration depth).

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