

Lesson Plan

Class : B.Sc. 1st Year

Semester : 2nd

Subject : Physics

Paper : Mechanics-II and Electricity and Magnetism-II

Submitted By : Dr. Parveen Jain

Session : 2023-24

(Assistant Professor in Physics)

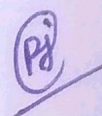
Month	Topic
January, 2024	<p>MECHANICS-II:-UNIT-I Constrained motion, Degree of freedom and Generalized coordinates, Generalized displacement, velocity, acceleration, momentum, force and potential, Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Application of Lagrange's equation for simple problems of mechanics; <i>Assignment No. 1</i></p> <p>UNIT-II:- Oscillations: Simple harmonic motion, Simple pendulum, Compound Pendulum,</p>
Februaury, 2024	<p>Differential equation of SHM and its solutions. Kinetic and Potential Energy Total Energy and their time averages, Damped oscillations, Forced oscillations. <i>Test No. 1</i></p> <p>UNIT-III:- Special Theory of Relativity: Michelson-Morley Experiment and its outcome, Galilean transformation (velocity, acceleration) and its inadequacy, Postulates of Special Theory of Relativity, Lorentz Transformations. <i>Assignment No. 2</i></p> <p>UNIT-IV:- Application of Relativity: Lorentz contraction, Time dilation, Relativistic transformation of velocity, frequency and wave number, Relativistic addition of velocities, Variation of mass with velocity, Massless Particles,</p>
March, 2024	<p>Mass-energy Equivalence, Relativistic Doppler effect, Relativistic Kinematics, Transformation of Energy and Momentum, Four Vectors.</p> <p>Electricity and Magnetism-II:-</p> <p>UNIT-I:- Electromagnetic Induction: Motional EMF, Faraday's laws of electromagnetic induction, Lenz's law, Self and mutual inductance (L and M respectively), Self induction of a single coil, Mutual induction of two coils, Transformers, Energy stored in magnetic field, The continuity equation. <i>Assignment No. 1</i></p> <p>UNIT-II:- Maxwell's equations: Maxwell's fixing of Ampere's law, Displacement current, Maxwell's equations in vacuum, Maxwell's equations in matter, Poynting Theorem and Poynting vector, <i>Test No. 1</i></p> <p><i>Holi Vacations</i></p>
April, 2024	<p>Momentum and angular momentum in electromagnetic field (no derivation needed), Energy density in electromagnetic field.</p> <p>UNIT-III:- The wave equation, Sinusoidal waves, Wave equations for E and B fields, Electromagnetic wave propagation through</p>

vacuum and isotropic dielectric medium, transverse nature of EM waves, Energy and momentum in EM waves, Propagation in linear media, Reflection and transmission at Normal and Oblique incidence, Brewster's angle.

UNIT-IV:-

Scalar and vector potential for electromagnetic fields, Gauge Transformation, Coulomb Gauge, Lorentz Gauge, Electric and magnetic dipole radiation (no derivation needed, discussion of results only) *Assignment No. 2*

Magnetism as relativistic phenomenon, Transformation of electric and magnetic fields between two inertial frames. *Test No. 2*



(Dr. Parveen Jain)