# Personal Profile

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| Name | Pankaj |
| Designation | Assistant Professor |
| E-mail | panku111297@gmail.com |
| Academic Qualification | M.Sc./NET/SET |
| Specialization | - |
| Teaching Experience | 1 year |
| Courses/Training Programme Attended | 1 |
| **Conferences/Seminars/Workshops/FDP** | |
| International Conferences/Seminars | - |
| National Conferences/Seminars | - |
| Workshops Attended | - |
| Faculty Development Programmes | - |
| Publications | - |
| Any other information | - |

# Teaching Plan Annexure-III

**ANNUAL TEACHING PLAN:**

**Unit wise teaching Plan Session 2024-25**

**MECHANICS: PHYS101**

| Month | Week | Topics | Teaching Method | Student Activity |
|---|---|---|---|---|
| **August** | **1st** | **Ordinary Differential Equations:** 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. | Lecture | Discussion |
| | **2nd** | **Coordinate systems and motion of a particle:** Volume, velocity and acceleration in Cartesian and Spherical co-ordinate systems, Solid angle. | Lecture/ PPT | Discussion |
| | **3rd** | **Space Time Symmetry and Conservation Laws:** Homogeneity and isotropy of space and time, Relationship of conservation laws and symmetries of space and time. | Lecture | Discussion |
| | **4th** | **Inertial frames of reference**: Galilean transformation and Galilean invariance. | Lecture | Discussion |
| **September** | **1st** | **Non-inertial frame of reference:** Coriolis force and its applications, Foucault's pendulum. | Lecture/ PPT | Discussion |
| | **2nd** | Newton's Law of Gravitation, Various forces in nature. | Lecture/ PPT | Assignment |
| | **3rd** | Central and non-central forces, Inverse square force, Centre of mass, Equivalent one body problem. | Lecture/ PPT | Q/Ans. |
| | **4th** | Reduced mass, angular momentum in central force field Equation of motion under a force law**.** | Lecture/ PPT | Discussion |
| **October** | **1st** | Equation of orbit and turning points, relationship between eccentricity and energy, Kepler's laws, Basic idea of global positioning system (GPS). | Lecture | Discussion |
| | **2nd** | **Rotational Motion:**Angular velocity, angular momentum, Torque, Conservation of angular momentum. | Lecture | Discussion |
| | **3rd** | **Kinematics of Elastic and Inelastic Collisions:** Elastic and inelastic collisions, coefficient of restitution, Elastic collisions in laboratory system. | Lecture | Discussion |
| | **4th** | **Kinematics of Elastic and Inelastic Collisions:** Elastic collisions in C.M. systems, Velocities, angle and energies in elastic collisions in C.M. and laboratory Systems. | Lecture/ PPT | Assignment |
| **November** | **1st** | **Classical Scattering:** Cross- section for | Lecture | Assignment |

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| | | elastic scattering, Rutherford scattering (with derivation). | | |
| | **2nd** | Concept of stationary universal frame of reference and search for ether. Michelson-Morley experiment. | Lecture | Discussion |
| | **3rd** | **Special theory of relativity:** Postulates of special theory of relativity. Lorentz transformations. Observer in relativity. Relativity of simultaneity. | Lecture/ PPT | Discussion |
| | **4th** | **Effects of Relativity:** Length contraction. Time dilation, Relativistic addition of velocities | Lecture/ PPT | Assignment |
| **December** | **1st** | **Effects of Relativity:** Variation of mass with velocity and mass energy equivalence. Increase of mass in an inelastic collision | Lecture/ PPT | Assignment |
| | **2nd** | Relativistic momentum and energies. Transformation of momentum and Energy. | Lecture | Discussion |
| | **3rd** | Midterm Test | | |
| | **4th** | Midterm Test | | |
| **February** | **1st** | Relativistic Doppler effect. Minkowsky space | Lecture | Discussion |
| | **2nd** | Revision/Presentations by students/ remedial Classes | | |
| | **3rd** | Revision/Presentations by students/ remedial Classes | | |
| | **4th** | Revision/Presentations by students/ remedial Classes | | |
| **March** | **1st** | Revision, question/answer/ Final Practical. | | |

**Pankaj**
**Assistant Professor Physics**

**Unit wise teaching Plan Session 2024-25**
**ELECTRICITY, MAGNETISM AND EMT: PHYS102TH**

| Month | Week | Topic | Teaching Method | Student Activity |
|---|---|---|---|---|
| **August** | **1st** | **Vector Analysis**: Vector algebra, Gradient, Divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem, Stokes's theorem, Green's theorem. | Lecture | Discussion |
| | **2nd** | **Electric Field:** Electrostatic force, Electrostatic Field, electric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. | Lecture | Discussion |
| | **3rd** | **Electric Potential:** electrostatic potential, electrostatic potential energy. Electric potential due to a dipole and quadrupole, long | Lecture | Discussion |

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| | | uniformly changed wire, charged disc, Electric potential energy. Electric field as a gradient of a scalar potential. | | |
| | **4th** | **Electric Current:** Current and current density. Continuity equation, Microscopic form of Ohm's law and conductivity. Failure of Ohms law and its explanation. Invariance of charge. | Lecture | Discussion |
| **September** | **1st** | **Magnetism:** Ampere circuital law and its applications. Hall Effect, Expression for Hall constant and its significance. Divergence and curl of magnetic field **B**. Vector potential: Definition of vector potential **A** and derivation. | Lecture/ PPT | Discussion |
| | **2nd** | **Field of Moving Charges:** E in different frames of reference. Field of a point charge moving with constant velocity. Field of charge that starts or stops. Interaction between moving charge and force between parallel currents. | Lecture | Discussion |
| | **3rd** | **Surface current density**: its definition and uses in calculation of change in magnetic field at a current sheet. Transformation equations of E and B from one frame of reference to another. | Lecture | Discussion |
| | **4th** | **Dielectrics**: Parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, | Lecture/ PPT | Discussion |
| **October** | **1st** | **Displacement vector D**: Molecular interpretation of Claussius - Mossotti equation, boundary conditions satisfied by **E** and **D** at the interface between two homogenous dielectrics, illustration through a simple example**.** | Lecture | Discussion |
| | **2nd** | **Polarization of matter:** Atomic and molecular dipoles, induced. Dipole moment and atomic polarizability. Electric susceptibility and polarization vector. . | Lecture/ PPT | Assignment |
| | **3rd** | **Dielectrics:** Capacity of a capacitor filled with Dielectrics, Gauss's law in Dielectrics, Displacement vector, Energy stored in a dielectric medium | Lecture/ PPT | Q/Ans. |
| | **4th** | **Magnetic Fields in Matter**: Behavior of various substances in magnetic fields. Definition of M and H and their relation to free and bound currents. Magnetic permeability and susceptibility and their interrelation. | Lecture/ PPT | Q/Ans. |
| **November** | **1st** | **Magnetic Materials:** Orbital motion of | Lecture | Discussion |

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| | | electrons and diamagnetism. Electron spin and paramagnetic, Ferromagnetism. Domain theory of ferromagnetism, magnetization curve, hysterics loss, ferrites. | | |
| | **2nd** | Displacement current, Maxwell's equations and their physical interpretation | Lecture | Assignment |
| | **3rd** | **Electromagnetic wave propagation:** EM waves and wave equation in a medium having finite permeability and permittivity but with conductivity = 0 | Lecture | Discussion |
| | **4th** | **Poynting Theorem:** Poynting vector, Poynting theorem, Impedance of a dielectric to EM waves, | Lecture/ PPT | Discussion |
| **December** | **1st** | EM waves in conducting medium and skin depth. | Lecture/ PPT | Discussion |
| | **2nd** | EM waves velocity in a conductor and anomalous dispersion. | Lecture | Discussion |
| | **3rd** | **Midterm Test** | | |
| | **4th** | **Midterm Test** | | |
| **February** | **1st** | Reflection and Transmission of EM waves at a boundary of two dielectric media for normal and oblique incidence of reflection of EM waves from the surface of a conductor at normal incidence. | Lecture/ PPT | Q/Ans. |
| | **2nd** | Revision/Presentations by students/ remedial Classes | | |
| | **3rd** | Revision/Presentations by students/ remedial Classes | | |
| | **4th** | Revision/Presentations by students/ remedial Classes | | |
| **March** | **1st** | Revision, question/answer/ Final Practical. | | |

**Pankaj**
**Assistant Professor Physics**

**Unit wise teaching Plan Session 2024-25**
**STATISTICAL AND THERMAL PHYSICS: PHYS201**

| Month | Week | Topic | Teaching Method | Student Activity |
|---|---|---|---|---|
| **August** | **1st** | **Basic Ideas of Statistical Physics:** Scope of statistical physics, basic ideas about probability, distribution of four distinguishable particles in two compartments of equal sizes. | Lecture | Discussion |
| | **2nd** | Concept of macro-states, micro-states, thermodynamic probability, effect of constraints on the system. | Lecture | Discussion |
| | **3rd** | Distribution of n particles in two compartments, Deviation from the state of maximum probability. | Lecture | Discussion |
| | **4th** | Equilibrium state of a dynamic system, distribution of n distinguishable particles in k | Lecture | Discussion |

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| | | compartments of unequal sizes. | | |
| **September** | **1st** | **Phase space:** Division of phase space into elementary cells, Three kinds of statistics. The basic approach in the three statistics. | Lecture/ PPT | Discussion |
| | **2nd** | **Maxwell-Boltzmann Statistics:** Applied to an ideal gas in equilibrium, experimental verification of the Maxwell Boltzmann's law of distribution of molecular speeds. | Lecture/ PPT | Assignment |
| | **3rd** | **Quantum Statistics**: Need for quantum statistics, 'h' as a natural constant and its implications, indistinguishable particles and its implications. | Lecture/ PPT | Q/Ans. |
| | **4th** | **Bose Einsteinstatistics:** Derivation of Planck's law of radiation, deduction of Wien's distribution law and Stefan's law from plank's law. | Lecture/ PPT | Discussion |
| **October** | **1st** | **Fermi Dirac Statistics** Applications to liquid helium, free electrons gas (Fermi level and Fermi Energy), | Lecture | Discussion |
| | **2nd** | **Laws of Thermodynamics:** Thermodynamic processes**.** Thermoelectric effects- Seebeck effect, Peltier effect, Thomson effect. | Lecture/ PPT | Q/Ans. |
| | **3rd** | **Entropy:** Change of entropy along a reversible path in a p-v diagram, entropy of a perfect gas, equation of state of ideal gas from simple statistical considerations, heat death of the universe. | Lecture | Discussion |
| | **4th** | **Statistical Interpretation of entropy:** Statistical definition of entropy, change of entropy of system, additive nature of entropy, law of increase of entropy. | Lecture/ PPT | Discussion |
| **November** | **1st** | **Reversible And Irreversible Processes**: Example of reversible and irreversible processes. Work done in a reversible process, example of entropy in natural process, entropy and disorder | Lecture | Discussion |
| | **2nd** | **Thermodynamic Potentials:** Enthalpy, Gibbs, Helmholtz and Internal Energy functions. | Lecture | Assignment |
| | **3rd** | **Maxwell's thermodynamic relations**: Derivation of Maxwell's thermodynamic relations | Lecture | Discussion |
| | **4th** | **Applications of thermodynamics relations**: Cooling produced by adiabatic stretching, adiabatic compression, adiabatic Stretching of a wire, stretching of thin films, | Lecture/ PPT | Discussion |
| **December** | **1st** | Change of internal energy with volume. Clausius-Clapeyron Equation, | Lecture/ PPT | Discussion |
| | **2nd** | Thermodynamical treatment of Joule- | Lecture | Discussion |

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| | | Thomson effect for liquification of Helium. | | |
| | **3rd** | **Midterm Test** | | |
| | **4th** | **Midterm Test** | | |
| **February** | **1st** | Production of very low temperatures by adiabatic demagnetization, TdS equations. | Lecture | Discussion |
| | **2nd** | Presentations by students/ remedial Classes | | |
| | **3rd** | Presentations by students/ remedial Classes | | |
| | **4th** | Presentations by students/ remedial Classes | | |
| **March** | **1st** | Revision, question/answer/ Final Practical. | | |

Pankaj
Assistant Professor Physics

**Unit wise teaching Plan Session 2024-25**
**WAVES AND OPTICS: PHYS202**

| Month | Week | Topic | Teaching Method | Student Activity |
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| **August** | **1st** | **Simple harmonic motion**: characteristics, graphical representation of SHM, phase relation between displacement, velocity and acceleration of a particle, executing SHM, SHM oscillator (mass attached to a spring placed on horizontal frictionless surface). | Lecture/ PPT | Discussion |
| | **2nd** | **Simple harmonic motion**: Energy of a simple harmonic oscillator. Solution of the differential equation of SHM. Average kinetic energy, average potential energy and total energy. | Lecture | Discussion |
| | **3rd** | **Damped SHM:** Damped oscillations. Differential equation of motion of one dimensional damped harmonic mechanical oscillator. Types of damping | Lecture | Discussion |
| | **4th** | Damped harmonic electric oscillator (differential equation and its solutions). Determination of the damping constants. | Lecture | Discussion |
| **September** | **1st** | Logarithmic decrement. Relaxation time, Quality factor, power dissipation in a damped harmonic oscillator when damping is weak | Lecture/ PPT | Discussion |
| | **2nd** | Relation between power dissipation energy and relaxation time of damped harmonic oscillator. | Lecture/ PPT | Assignment |
| | **3rd** | **Forced Oscillator:** Transient and steady behavior of forced oscillator. Displacement and velocity variation with driving force frequency. Variation of phase with frequency. | Lecture/ PPT | Q/Ans. |
| | **4th** | **Forced Oscillator:** Power supplied to an oscillator and its variation with frequency. Q-value and band width. Q-value as an | Lecture/ PPT | Discussion |

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| | | amplification factor. | | |
| **October** | **1st** | **Coupled Oscillators:** Stiffness coupled pendulums. Normal co-ordinates and normal modes of vibration. Inductance coupling of electrical oscillators. | Lecture | Discussion |
| | **2nd** | **Wave motion:** The type of waves. The wave equation and its solution. Characteristic impedance of a string. Impedance matching. | Lecture | Discussion |
| | **3rd** | **Wave motion:** Reflection and transmission of energy. Reflected and transmitted energy coefficients. Standing waves on a string of fixed length. Energy of a vibrating string. Wave velocity and group velocity | Lecture | Discussion |
| | **4th** | **Wave Optics:** Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. | Lecture | Discussion |
| **November** | **1st** | **Interference:** Division of wavefront and division of amplitude. Young's Double Slit experiment, Lloyd's Mirror and Fresnel's Biprism. | Lecture | Discussion |
| | **2nd** | **Interference:** Phase change on reflection: Stokes' treatment. Interference in Thin Films, parallel and wedge-shaped films, Fringes of equal inclination (Haidinger Fringes) and Fringes of equal thickness (Fizeau Fringes). | Lecture/ PPT | Q/Ans. |
| | **3rd** | **Newton's Rings:** Measurement of wavelength and refractive index.<br>**Michelson's Interferometer.** | Lecture/ PPT | Discussion |
| | **4th** | **Diffraction:** Fraunhofer diffraction: Single slit; Double Slit. Multiple slits & Diffraction grating, Dispersive power of diffraction grating, Fresnel Diffraction: | Lecture/ PPT | Discussion |
| **December** | **1st** | **Diffraction:** Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis | Lecture/ PPT | Q/Ans. |
| | **2nd** | **Polarization:** Transverse nature of light waves. Unpolarized and plane polarized light, production of polarized light, Wire grid polarizer, Polaroid, Effect of intensity of light passing through Polaroid, Malus' law, Polarization by reflection (Brewster law) | Lecture/ PPT | Discussion |
| | **3rd** | **Midterm Test** | | |
| | **4th** | **Midterm Test** | | |
| **February** | **1st** | **Double refraction:** Ordinary ray and extraordinary ray, positive and negative crystals, Birefringence, Nicol Prism, quarter wave plate and half wave plate, production of elliptically polarized and circularly polarized light. | Lecture | Discussion |

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| | **2nd** | Revision/Presentations by students/ remedial Classes |
| | **3rd** | Revision/Presentations by students/ remedial Classes |
| | **4th** | Revision/Presentations by students/ remedial Classes |
| **March** | **1st** | Revision, question/answer/ Final Practical. |

Pankaj
Assistant Professor Physics

**Unit wise teaching Plan Session 2024-25**
**ELEMENTS OF MODERN PHYSICS: PHYS301**

| Month | Week | Topic | Teaching Method | Student Activity |
|---|---|---|---|---|
| **August** | **1st** | Planck's constant and light as a collection of photons, Photo-electric effect and Compton scattering. | Lecture/ PPT | Discussion |
| | **2nd** | **Atomic Structure:** Rutherford atomic model, Bohr's atomic model, Bohr's quantization rule and atomic stability, calculation of energy levels for hydrogen like atoms and their spectra. | Lecture/ PPT | Discussion |
| | **3rd** | **Heisenberg uncertainty principle** - Estimating minimum energy of a confined principle, Energy-time uncertainty. | Lecture | Discussion |
| | **4th** | Wave-particle duality. Matter waves and De Broglie wavelength, Davisson-Germer experiment. | Lecture | Discussion |
| **September** | **1st** | Wave function and its properties, Schrodinger equation, Momentum and Energy operators, expectation value, stationary states. | Lecture/ PPT | Discussion |
| | **2nd** | **Wave function:** Principle and physical interpretation of wave function, probabilities and normalization; | Lecture/ PPT | Assignment |
| | **3rd** | Probability and probability current densities in one dimension. Orthogonality, Parity. | Lecture/ PPT | Q/Ans. |
| | **4th** | One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization, Quantum dot as an example. | Lecture/ PPT | Discussion |
| **October** | **1st** | Quantum mechanical scattering and tunnelling in one dimension - across a step potential | Lecture | Discussion |
| | **2nd** | Rectangular potential barrier, Harmonic Oscillator. | Lecture | Discussion |
| | **3rd** | Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle, Mass defect and packing fraction. | Lecture/ PPT | Q/Ans. |
| | **4th** | Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy, | Lecture | Discussion |

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| | | Liquid drop model. | | |
| **November** | **1st** | **Radioactivity:** Stability of nucleus; Law of radioactive decay. | Lecture | Discussion |
| | **2nd** | Mean life, half-life., average life time, radioactive series, laws of successive disintegration. | Lecture | Assignment |
| | **3rd** | **α Decay:** Properties of α Rays, Geiger-Nuttal law, Gamow's theory of α decay | Lecture | Discussion |
| | **4th** | β Decay: Different modes of β Decay, energy released, spectrum and Pauli's prediction of neutrino, γ-ray emission | Lecture/ PPT | Discussion |
| **December** | **1st** | **Fission and fusion:** Mass deficit, relativity and generation of energy; | Lecture/ PPT | Q/Ans. |
| | **2nd** | **Fission:** Nature of fragments and emission of neutrons. | Lecture | Discussion |
| | **3rd** | Midterm Test | | |
| | **4th** | Midterm Test | | |
| **February** | **1st** | **Nuclear reactor:** Slow neutrons interacting with Uranium 235, Fusion and thermonuclear reactions. | Lecture/ PPT | Discussion |
| | **2nd** | Revision/Presentations by students/ remedial Classes | | |
| | **3rd** | Revision/Presentations by students/ remedial Classes | | |
| | **4th** | Revision/Presentations by students/ remedial Classes | | |
| **March** | **1st** | Revision, question/answer/ Final Practical. | | |

Pankaj
Assistant Professor Physics

**Unit wise teaching Plan Session 2024-25**
**QUANTUM MECHANICS: PHYS305**

| Month | Week | Topic | Teaching Method | Student Activity |
|---|---|---|---|---|
| **August** | **1st** | **Time dependent Schrodinger equation:** Time dependent Schrodinger equation and dynamical evolution of a quantum state, Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; | Lecture | Discussion |
| | **2nd** | Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum & Energy operators, commutator of position and momentum operators, Expectation values of position and momentum. | Lecture/ PPT | Discussion |
| | **3rd** | Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigenvalues, Wave Function of a Free Particle. | Lecture | Discussion |

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| | **4th** | Expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; | Lecture | Discussion |
| **September** | **1st** | Application to the spread of Gaussian wave packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wavefunction; Position-momentum uncertainty principle. | Lecture/ PPT | Discussion |
| | **2nd** | General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels. | Lecture/ PPT | Assignment |
| | **3rd** | Particle in a box, Application to one-dimensional problem- square well potential; | Lecture/ PPT | Q/Ans. |
| | **4th** | Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions. | Lecture/ PPT | Discussion |
| **October** | **1st** | **Class Test** | **Class Test** | **Class Test** |
| | **2nd** | **Quantum theory of hydrogen-like atoms:** Time independent Schrodinger equation in spherical polar coordinates; separation of variables for the second order partial differential equation. | Lecture/ PPT | Discussion |
| | **3rd** | Angular momentum operator and quantum numbers, Radial wave functions, Orbital angular momentum quantum numbers, s, p, d,.. shells | Lecture | Discussion |
| | **4th** | Atoms in Electric and Magnetic Fields- Electron Angular Momentum. Space Quantization. Electron Spin and Spin Angular Momentum | Lecture | Discussion |
| **November** | **1st** | Larmor's Theorem, Spin Magnetic Moment. Stern Gerlach Experiment. Zeeman Effect | Lecture | Discussion |
| | **2nd** | Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. | Lecture | Assignment |
| | **3rd** | **Atoms in External Magnetic Fields**: Zeeman Effect, Normal and Anomalous Zeeman Effect. | Lecture | Discussion |
| | **4th** | **Many electron atoms:** Periodic table, Pauli's Exclusion Principle, Symmetric and Antisymmetric Wave Functions. | Lecture/ PPT | Discussion |
| **December** | **1st** | Fine structure, Spin orbit coupling. | Lecture/ PPT | Discussion |
| | **2nd** | Spectral Notations for Atomic States. Total Angular Momentum. | Lecture | Discussion |
| | **3rd** | **Midterm Test** | | |
| | **4th** | **Midterm Test** | | |

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| **February** | **1st** | Vector Model, Spin-orbit coupling in atoms- L-S and J-J couplings. | Lecture | Discussion |
| | **2nd** | Revision/Presentations by students/ remedial Classes | | |
| | **3rd** | Revision/Presentations by students/ remedial Classes | | |
| | **4th** | Revision/Presentations by students/ remedial Classes | | |
| **March** | **1st** | Revision, question/answer/ Final Practical. | | |

Pankaj
Assistant Professor Physics

## Course Outcome Annexure-IV

| Name of the Course | Objectives | Course Outcome |
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| **MECHANICS PHYS101** | To introduce students to the fundamental principles that govern the motion of objects and forces acting on them. | Students will be able to explain and apply the fundamental concepts of mechanics like Coordinate systems, Frame of reference, Inverse Square forces, rotational motion and special relativity. |
| **ELECTRICITY AND MAGNETISM PHYS102** | To provide students with thorough understanding of fundamental principles and mathematical tools to describe and analyse electric and magnetic phenomena. | Students will be able to explain the concepts of electric field, current, potential, magnetic field, magnetic effects of current, Field of moving charges, Electromagnetic waves and their interactions with matter. |
| **STATISTICAL PHYSICS AND THERMODYNAMICS PHYS201** | To introduce students to various types of statistics in physics that are used to study system of large number of particles and establish laws of thermodynamics using principles of statistics. | Students will be able apply statistical methods to understand system of particles, Black body radiation and behaviour of thermodynamical system and also understand laws of thermodynamics, concept of Entropy, Maxwell's thermodynamic relations and their applications. |
| **WAVES AND OPTICS PHYS202** | To introduce students to concept Simple Harmonic Motion and Wave motion and optical phenomenon like interference, Diffraction and | Students will be able to explain the concept of Damped and Forced oscillator, coupled oscillator, principles of wave motion andoptical phenomenon |

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| | Polarisation. | like interference, diffraction and Polarisation of light wave. |
| **COMPUTATIONAL PHYSICS PHYS204** | To provide programming skills and understandingof numerical methods and algorithms to solve physical problems. | Students will gain proficiency in programming languages like Fortran and will be able to apply computational tools and numerical methods to solve physical and mathematical problems. |
| **ELECTRICAL CIRCUITS AND NETWORKING SKILLS PHYS205** | To provideunderstanding of electricity, electrical circuits and its components and impart skills of connecting electrical circuits. | Students will be able to understand about basic electricity principles, electrical circuits, Generator, transformer, electric motor and electric wiring. |
| **ELEMENTS OF MODERN PHYSICS PHYS301** | To develop an understanding of concepts like quantum mechanics, Wave particle duality, quantum uncertainty, atomic structures and nuclear physics. | Students will be able to explain principles of quantum mechanics and concepts of wave function, Wave particle duality, models of atomic structure and Nuclear Physics Phenomenon like radioactivity, Fission and Fusion. |
| **QUANTUM MECHANICS PHYS305** | To introduce students to principles of quantum mechanics and mathematical tools that are used for studying quantum systems. | Students will be able to explain various concepts of quantum mechanics like wave function, Schrodinger equation and its solution and apply quantum principles to Hydrogen like atoms and many electron atoms to explain quantisation,spin - orbit coupling, fine structure splittingand Zeeman effect. |
| **RADIATION SAFETY PHYS307** | To develop understanding of the nature of radiation, its effects, detection methods and how to manage it safely. | Students will be able to understand about the nature and types of radiation and their interaction with matter, detection methods and radiation safety management. |
| **WEATHER FORECASTING PHYS309** | To introduce students to the basics of weather systems and weather forecasting methods. | Students will gain basic knowledge about atmosphere, weather systems, climate change and weather forecasting methods. |

## Courses Offered

## Annexure-V

| Year | DSC Name & Code | SEC Name & Code | DSE Name & Code |
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| **B.Sc.-I** | 1. MECHANICS<br>**PHYS 101**<br><br>2. ELECTRICITY AND MAGNETISM<br>**PHYS 102** | | |
| **B.Sc.-II** | 1. STATISTICAL PHYSICS AND THERMODYNAMICS<br>**PHYS201**<br><br>2. WAVES AND OPTICS<br>**PHYS202** | 1.COMPUTATIONAL PHYSICS<br>**PHYS204**<br><br>2. ELECTRICAL CIRCUITS AND NETWORKING SKILLS<br>**PHYS205** | |
| **B.Sc.-III** | | 1. RADIATION SAFETY<br>**PHYS307**<br><br>2. WEATHER FORECASTING<br>**PHYS309** | 1. ELEMENTS OF MODERN PHYSICS<br>**PHYS301**<br><br>2**.** QUANTUM MECHANICS<br>**PHYS305** |

## Department of Physics
## Cross Cutting Issues

| Sr. No | Topics | Course |
|---|---|---|
| **1** | **Radiation safety management**:<br>Biological effects of ionizing radiation.<br>Introduction of safety and risk management of radiation.<br>Nuclear waste and disposal management. | RADIATION SAFETY<br>**PHYS307** |
| **2** | **Climate Change:**<br>Causes of climate change, Global warming and its outcomes, air pollution, aerosols, ozone depletion, acid rain, environmental issues related to climate. | WEATHER FORECASTING<br>**PHYS309** |
| **3** | **Alternate Sources of energy:**<br>Solar energy, Wind Energy, Ocean Energy, Geothermal Energy, Hydro Energy, Piezoelectric Energy harvesting, Electromagnetic Energy Harvesting. | RENEWABLE ENERGY AND ENERGY HARVESTING<br>**PHYS309** |

**Introduction of the subject**

Physics is a branch of science that explores the fundamental principles governing the natural world. In physics we study matter, energy, space, and time, as well as the interactions between them. By understanding these concepts, physics seeks to uncover the laws that dictate how the universe operates, from the smallest subatomic particles to the largest galaxies.

Department of Physics in GDC Kandaghat offers B.Sc. Physic Degree course and follows syllabus designed by Himachal Pradesh university, Shimla. The syllabus comprehensively covers keyareas of study in Physics like Classical Mechanics, Electromagnetism, Thermodynamics, Optics, Quantum Mechanics, Solid State Physics and Electronics, Nuclear and Particle Physics, Astrophysics etc. We strive to give theoretical as well as practical knowledge of the subject through innovative and engaging teaching learning processes. Skill enhancement courses are also taught along with core courses in physics to equipe students with working skills.

**Why to study Physics:**

Physics provides insights into how the universe works, explaining phenomena from daily life to cosmic events. It has driven the development of modern technologies such as machines, electricity, electronic devices, computers and telecommunications.It encourages curiosity, critical thinking, and problem-solving skills, making it a cornerstone of scientific discovery and helpful in every walk of life.