

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2024-25) ODD SEMESTER

Name of Teacher: Aashi Mittal
 Designation: Assistant Professor
 Subject: Physics
 Class: B.Sc-I(Physical Science)

Months	Topics to be covered
August	Fundamentals of Dynamics: Rigid body, Moment of Inertia, Radius of Gyration, Theorems of perpendicular and parallel axis (with proof). Moment of Inertia of ring, Disc, Angular Disc, Solid cylinder, Solid sphere, Hollow sphere, Rectangular plate, Square plate, Solid conc. Triangular plate, Torque, Rotational Kinetic Energy, Angular momentum, Law of conservation of angular momentum, Rolling motion, condition for pure rolling, acceleration of body rolling down an inclined plane, Fly wheel, Moment of Inertia of an irregular body..
September	Unit 2: Elasticity: Deforming force, Elastic limit, stress, strain and their types, Hooks law, Module of elasticity Relation between shear angle and angle of twist, elastic energy stored/volume in an Elastic body, Elongation produced in heavy rod due to its own weight and elastic potential energy stored in it, Poisson's ratio and its limiting value, Relation between Young modulus, Bulk modulus and Poisson ratio. Derive the Relation between Young's modulus, Bulk modulus and Modulus of rigidity. Torque required for twisting cylinder, Bending of beam, bending moment and its magnitude, Bending of cantilever (loaded by a weight W at its free end). Weight of cantilever uniformly distributed over its entire length. Dispersion of a centrally loaded beam supported at its ends, determination of clastic constants for material of wire by Searle's method.
October	Unit III: Special Theory of Relativity: Michelson's Morley experiments and its outcome, Postulate of special theory of relativity, Lorentz Transformation. Simultaneity and order of events, Lorentz contraction, Time dilation, Relativistic transformation of velocity, relativistic addition of velocities, variation of mass-energy equivalence, relativistic Doppler effect. MID TERM EXAM
November	Unit 4: Gravitation and central force motion: Law of gravitation, Potential and field due to spherical shell and solid sphere. Motion of a particle under central force filed, Two body problem and its reduction to one body problem and its solution, determination ofg by means of bar Normal coordinates and normal modes, Normal modes of vibration given spring mass system, possible angular frequencies of oscillation two identical simple pendulums of length (l) and small bob of mass joined together with spring of spring constant (k.) Assignment Revision and doubt class

October	Unit 1: Fundamentals of Dynamics: Rigid body, Moment of Inertia, Radius of Gyration, Theorems of perpendicular and parallel axis (with proof). Moment of Inertia of ring, Disc, Angular Disc, Solid cylinder, Solid sphere, Hollow sphere, Rectangular plate, Square plate, Solid conc. Triangular plate, Torque, Rotational Kinetic Energy, Angular momentum, Law of conservation of angular momentum, Rolling motion, condition for pure rolling, acceleration of body rolling down an inclined plane, Fly wheel, Moment of Inertia of an irregular body..
September	Unit 2: Elasticity: Deforming force, Elastic limit, stress, strain and their types, Hooks law, Module of elasticity Relation between shear angle and angle of twist, elastic energy stored/volume in an Elastic body, Elongation produced in heavy rod due to its own weight and elastic potential energy stored in it, Poisson's ratio and its limiting value, Relation between Young modulus, Bulk modulus and Poisson ratio. Derive the Relation between Young's modulus, Bulk modulus and Modulus of rigidity. Torque required for twisting cylinder, Bending of beam, bending moment and its magnitude, Bending of cantilever (loaded by a weight W at its free end). Weight of cantilever uniformly distributed over its entire length. Dispersion of a centrally loaded beam supported at its ends, determination of clastic constants for material of wire by Searle's method.
October	Unit III: Special Theory of Relativity: Michelson's Morley experiments and its outcome, Postulate of special theory of relativity, Lorentz Transformation. Simultaneity and order of events, Lorentz contraction, Time dilation, Relativistic transformation of velocity, relativistic addition of velocities, variation of mass-energy equivalence, relativistic Doppler effect. MID TERM EXAM
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Lesson Plan

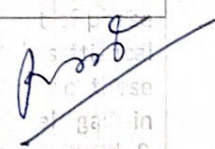
Dr. Ramesh Kumar, Assistant Professor, Physics

Course: Thermodynamics and Statistical Physics

Semester III

2024-2025

Month	Syllabus
July/August	<p>THERMODYNAMICS-I</p> <p>Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics. First law of thermodynamics and internal energy, Conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Coefficient, Reversible and Irreversible processes, Second law of thermodynamics, Entropy, Carnot's Cycle & Carnot's theorem, Entropy changes in reversible and irreversible Processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero.</p>
September	<p>THERMODYNAMICS-II</p> <p>Thermodynamic Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energy Functions, Maxwell's relations and applications – Joule-Thompson Effect, Clausius- Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS Equations</p>
October	<p>Statistical Physics-I</p> <p>Basics idea of probability, Priori probability, Statistical probability, Permutation and combination, distinguishable and indistinguishable particles Distribution of N (for N= 2, 3, 4) distinguishable and indistinguishable Particles in two boxes of equal size, microstates and macrostates, Thermodynamical probability, constraints and accessible states, statistical Fluctuations, entropy and probability; Concept of phase space, division of Phase space into cells, postulates of statistical mechanics; Classical and Quantum statistics, basic approach to these statistics, Maxwell-Boltzmann Statistics applied to an ideal gas in equilibrium-energy distribution law, Maxwell's distribution of speed & velocity (derivation required), most Probable speed, average and r.m.s. speed, mean energy for Maxwellian Distribution.</p>
November	<p>Statistical Physics-II</p> <p>Need of Quantum statistics- classical versus quantum statistics, BoseEinstein energy distribution Law, Application of B. E. Statistics to Planck's Radiation law, Fermi-Dirac energy distribution Law, Fermi energy and Fermi Temperature; F. D. Energy distribution Law for electron gas in metals, zero Point energy, average speed (at 0 K) of electron gas</p>



Name of Assistant Prof. : Dr. Manju Sharma
Subject : Nuclear Physics

Class: B.Sc (5th Semester)

Month-2024	Units/Topics Covered
July/August-2024	Unit-1 (Nuclear Structure and properties of nuclei) History of Nuclear Physics, Models of atom; Thomson model, Rutherford model, Alpha ray scattering experiment, The Observations and Results. Determination of size of nucleus by Rutherford Back Scattering, Limitations. Nuclear hypothesis, Nuclear composition, mass and binding energy Systematic of nuclear binding energy, Average binding energy, mass defect, Numericals on Binding energy, Tutorial. Nuclear stability, Nuclear Size, Spin, Parity, Statistics, Magnetic Dipole Moment, Quadrupole Moment, Determination of mass by Bain-Bridge, Bain-Bridge and Jordan mass Spectrograph, Numericals.
September-2024	Origin of X-rays, Continuous and characteristics X-ray Spectra, Determination of charge by Mosley Law, Tutorial Unit-2 (Nuclear Radiation decay Processes): Alpha-disintegration and its theory. Energetics of alpha-decay, Energetics of Alpha Decay, Origin of continuous beta spectrum (neutrino hypothesis), Types of beta decay, Energetics of beta decay Nature of gamma rays, energetics of gamma rays, Interaction of heavy charged particles (Alpha particles), Energy loss of heavy charged particles (Bethe Formula), Geiger-Nuttal law, Range and straggling of alpha particles, Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles
October-2024	Interaction of gamma rays: Photoelectric effect, Compton effect, Pair-Production. Absorption of gamma rays (Mass attenuation coefficient) and its application. Unit-4 (Nuclear Reactions) Nuclear Reactions, Elastic Scattering, Inelastic Scattering Nuclear Disintegration, Photoneuclear Reactions, Radiative Capture, Direct Reactions, Heavy Ion Reactions and Spallation Reactions, Conservation Laws, Q-Value and Reaction Threshold, Nuclear Fission, Nuclear Reactors, General Aspects of Reactor Design, Nuclear fission Reactor (Principle, Construction, working and use), Nuclear Fusion Reactors (Principle, Construction, working and use), Numericals on Q-value and Threshold energy
November-2024	Unit-3 (Nuclear Accelerators) Tendom accelerator, Linear accelerator, Cyclotron and Betatron accelerators Gas Filled counters, Ionization chamber, Proportional Counter, G.M. Counter, Scintillation Counter and Semiconductor Detector

October-2024

November-2024

Manju Sharma

Name of Assistant Prof. : Dr. Manoj Kumar
 Class : B.Sc. (NM) Vth Sem & B.Sc. (CS) Vth Sem
 Subject : Physics
 Paper- : Quantum and Laser Physics

	Topics Covered
July -2024	Need for Quantum Mechanics, Frank- Hertz experiment, de-Broglie hypothesis.
Aug- 2024	Davisson and Germer experiment, G.P. Thomson experiment. Phase velocity, group velocity and their relation. Heisenberg's uncertainty principle, Time energy and angular momentum, position uncertainty. Uncertainty principle from de Broglie wave. (Wave-particle duality). Gamma Ray Microscope.
Sept -2024	Electron diffraction from a slit. Derivation of 1-D time-dependent Schrodinger wave equation (subject to force, free particle). 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
Oct -2024	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).
Oct -2024	One dimensional step potential, One dimensional potential barrier
Sept -2024	Solution of Schrodinger equation for harmonic oscillator (quantization of energy, Zero-point energy, wave equation for ground state and excited states).
Nov- 2024	Absorption and emission of radiation, Main features of a laser: Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients and possibility of amplification, momentum transfer, life time of a level, kinetics of optical absorption ((two and three level rate equation, Fuchbauerlanderburg formula). population inversion:
Oct-2024	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).
Nov- 2024	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. Detector

Manoj

SEC-101 Electrical circuit network skills

Lesson plan- 2024-25
Assistant professor-Priyanka
Class- B.Sc. 1st year (sec. physics)

From 1st day of class 2024 :

Introduction to Electricity and Circuits: Basics of Electricity, Electric charges (positive and negative). Basic components of a circuit: battery, wires, bulb, switch, Conductors and insulators

Basic Electricity Principles: Voltage, Current, Resistance, and Power, Ohm's law, Series, parallel, and series-parallel combinations, AC Electricity and DC Electricity.

September 2024:

Understanding Electrical Circuits: AC and DC Voltage Sources, Current and voltage drop across the DC circuit elements, Kirchhoff's laws, Instruments to measure current, voltage, power in DC and AC circuits, Familiarization with multimeter, voltmeter and ammeter, Insulation, Preparation of extension board, Joints in electrical conductors, Techniques of soldering, Electrical Protection: Relays, Fuses and disconnect switches, Circuit breakers, Overload devices, Ground-fault protection, Grounding and isolating, Surge protection.

October 2024:

Smart Switches, Wi-fi enabled switches; Smart Bulbs; Ways to make smart home. Estimation of electric load, average electricity bill calculation, Electric Appliances: Fan, Bulb, LEDs, Working of Water Cooler, Working of Air Conditioner

NOVEMBER 2024:

Comparison of Inverter & Non Inverter Air Conditioners, Working of DC & AC Moto, Working of Water Pump, Inverter, Off-grid & on-grid Solar Systems for home, Ways to save electricity.

Note- assignment and Mid-term exam will be taken as per schedule.

October 2024:

Smart Switches, Wi-fi enabled switches; Smart Bulbs; Ways to make smart home. Estimation of electric load, average electricity bill calculation, Electric Appliances: Fan, Bulb, LEDs, Working of Water Cooler, Working of Air Conditioner

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MDC - PHYSICS FUNDAMENTAL (I)

Lesson plan- 2024-25
Assistant professor-Priyanka
Class- B.Sc. 1st year (MDCPhysics)

From 1st day of class 2024:

Physics-nature, scope & excitement, major discoveries in physics, major contribution by Indian Physicists, Physics in relation to other sciences, Impact of Physics on society, latest developments in Science and Technology.
System of measuring Units-Need for measurement, measuring process, concept of mass, length, time; Fundamental and derive units, system of units, concept of error, types of error (only definition), Accuracy and precision in measurement, least count and applications of measuring instruments- Vernier calliper and Screw Gauge.

September 2024:

Motion of objects in one dimension- position of object, origin/reference point, frame of reference, definition and example of motion in one, two and three dimensions, Scalar and Vector quantities description of motion against a straight line- distance and displacement, uniform motion and non-uniform motion, average and instantaneous speed, average and instantaneous velocity, acceleration; graphical analysis of straight line motion- distance- time graph, velocity- time graph.

Causes of motion- concept of force, Newton's 1st law of motion, inertia and mass; Newton's 2nd law of motion, momentum and force; 3rd law of motion, daily life applications of Newton's laws of motion.

System of measurement, measuring process, concept of mass, length, time; Fundamental and derive units, system of units, concept of error, types of error (only definition), Accuracy and precision in measurement, least count and applications of measuring instruments- Vernier calliper and Screw Gauge.

October 2024:

Universal law of gravitation and its importance, acceleration due to gravity and free fall of a body; mass and weight of an object on earth and moon, concept of thrust and pressure and importance in daily life.

Work, energy, types of energy-Kinetic energy and Potential energy, P.E. of an object at a height of object, origin/reference point, frame of reference, definition and example of motion in one, two and three dimensions, Scalar and Vector quantities description of motion against a straight line- distance and displacement, uniform motion and non-uniform motion, average and instantaneous speed, average and instantaneous velocity, acceleration; graphical analysis of straight line motion- distance- time graph, velocity- time graph.

NOVEMBER 2024:

Law of conservation of energy and its applications; Conservation of linear and angular momentum, collision (elastic and inelastic) and conservation laws in collisions- importance in daily life.

Causes of motion- concept of force, Newton's 1st law of motion, inertia and mass; Newton's 2nd law of motion, momentum and force; 3rd law of motion, daily life applications of Newton's laws of motion.

Note- assignment and Mid-term exam will be taken as per schedule.

October 2024:

Universal law of gravitation and its importance, acceleration due to gravity and free fall of a body; mass and weight of an object on earth and moon, concept of thrust and pressure and importance in daily life.

Work, energy, types of energy-Kinetic energy and Potential energy, P.E. of an object at a height of object, origin/reference point, frame of reference, definition and example of motion in one, two and three dimensions, Scalar and Vector quantities description of motion against a straight line- distance and displacement, uniform motion and non-uniform motion, average and instantaneous speed, average and instantaneous velocity, acceleration; graphical analysis of straight line motion- distance- time graph, velocity- time graph.

NOVEMBER

Law of conservation of energy and its applications; Conservation of linear and angular momentum, collision (elastic and inelastic) and conservation laws in collisions- importance in daily life.

Priyanka

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (SESSION- 2024-25) IIIrd SEMESTER

Name of Teacher: ANKITA
 Designation: Extension lecturer
 Subject: Physics *MDC*
 Class:

Subject/Paper : Sr. No.	Months	Topics to be covered	Remarks if any,
1	AUGUST	Unit 1: Basics of semiconductor and semiconductor devices-Atomic structure and energy levels. Energy bands (basic idea), definition of conductor, semiconductor and insulators (on the basis of energy gap), Intrinsic semiconductors, extrinsic semiconductors-p-type and n-type semiconductor), P-N junction diode-depletion layer, forward biasing and reverse biasing, V-I characteristics; Working of half wave and full wave rectifiers.	
2	SEPTEMBER	Unit 2: Basics of Laser systems - introduction to LASER, important properties of laser light, Principle of laser- Light amplification, population inversion and pumping; Working of laser- schematic diagram for functioning of laser, applications of Lasers in different fields of science and technology.	
3	OCTOBER	Unit 3: Introduction to nuclear physics I: Atomic nucleus and the nucleons, atomic number, mass number, isotopes, isobars and isotones; nuclear binding energy, Qualitative idea of liquid drop model. Qualitative idea of radioactivity and different type of radioactive decay- α , β , and γ - decay. Nuclear reactions and their types.	
4	NOVEMBER	Unit 4: Introduction to nuclear physics II: Carbon dating,	

		Nuclear fission reaction and its application as a source of energy (nuclear reactor) and hazardous aspect of nuclear fission; Nuclear fusion reaction and source of stellar energy.	
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Ankita

		Nuclear fission reaction and its application as a source of energy (nuclear reactor) and hazardous aspect of nuclear fission; Nuclear fusion reaction and source of stellar energy.	
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P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (SESSION- 2024-25) IIIrd SEMESTER

Name of Teacher: ANKITA
 Designation: Extension lecturer
 Subject: Physics *SEC*
 Class:

Subject/Paper : Sr. No.	Months	Topics to be covered	Remarks if any,
1	AUGUST	<p>Unit 1: Basic of Measurements</p> <p>Instruments accuracy, precision, sensitivity, resolution range, etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.</p> <p>Electronic Voltmeter:</p> <p>Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principle of voltage measurement (block diagram only). Specifications of an electronic Voltmeter and their significance. AC millivoltmeter: Types of AC millivoltmeter Block diagram of ac millivoltmeter, specifications and their significance.</p>	
2	SEPTEMBER	<p>Unit 2: Oscilloscope:</p> <p>Block diagram of basic CRO. CRT, measurement of voltage (DC and AC) and frequency and time period using CRO. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: principle of working.</p>	
3	OCTOBER	<p>Unit 3: Generators and Transformers:</p> <p>DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers. Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters and motors. Speed & power of ac motor.</p>	

Ankita

4	NOVEMBER	<p>Unit 4: Digital Instruments:</p> <p>Comparison of analog & digital instruments. Characteristics of a digital meter. Working principle of digital voltmeter. Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time-base stability, accuracy and resolution.</p>	
4		<p>Unit 4: Digital Instruments:</p> <p>Comparison of analog & digital instruments. Characteristics of a digital meter. Working principle of digital voltmeter. Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time-base stability, accuracy and resolution.</p>	

Ankita

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2024-25) ODD SEMESTER

Name of Teacher: Dr. Manoj Kumar

Designation: Assistant Professor

Subject: Physics

Class: B.Sc-I (Major in Physics)

Mathematical Physics

Months	Topics to be covered
August	Theory of Errors: Systematic and Random errors, Propagation of errors, Normal law of errors, Standard and Probable error, Least square fit, error on slope and intercept of fitted line. Matrices: Normal Matrices, Orthogonal Matrices, Hermitian Matrices, Unitary Matrices, Symmetric and Anti-symmetric Matrices, Conjugate of a Matrix, Anti-hermitian Matrices, Trace of Matrix, Eigen values and eigen vectors of Matrices, Diagonalization of Matrices.
September	Method of expansion of a function: Taylor's expansion, Power series, Laurent's theorem. Partial and ordinary differential equations, Partial Differential equations. First order differential equations, Method of separation of variables, Singular points, Vibrations of a elastic string, One dimensional Heat Flow, Heat conduction equation for a 3-dimensional rectangular configuration and apply it to the cooling of a brick (assuming constant initial temperature distribution), vibrations of an elastic string, vibrations of rectangular and circular membrane, Power series, Method of Frobenius, Diffusion equation, Laplace's equation in problems of rectangular, cylindrical and spherical symmetry.
October	Fourier series and Integrals: Introduction, Evaluation of coefficients of 11 Fourier series, cosine series, sine series, Dirichlet's theorem, Graphic representation of Even and odd functions, Extension of interval, complex form of Fourier series, Properties of Fourier series: Convergence, Integration, Differentiation, Parseval's theorem, Physical applications of Fourier series analysis, square wave, Half wave rectifier, Full wave rectifier, A sawtooth wave, A triangular wave, Fourier Integrals, Starting with the Fourier series, deduction of expressions for the Fourier Transform and its inverse.
September	MID TERM EXAM
November	Beta, Gamma, Legendre and Hermite Functions: Definition of gamma function, value of $\Gamma(1/2)$, Beta function, other forms of beta function, Relationship between beta and gamma function, Legendre's equation, Legendre's Polynomial, General solution of Legendre's equation, Generating function of Legendre's polynomial, orthogonality of Legendre's
October	Assignment and Revision and Doubt Class