P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2023-24) 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. Simultancity 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

Aashi

SEC-101 Electrical circuit network skills

Lesson plan- 2023-24
Assistant professor- Priyanka
Class- B.Sc. Ist year (sec. physics)

September 2023:

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.

October 2023:

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.

November 2023:

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

Priyanka

PHY – 104 (Physics Fundamentals -1)

Lesson plan- 2023-24
Assistant professor- Priyanka
Class- B.Sc. Ist year (MDC Physics)

September 2023:

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.

October 2023:

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 I^{st} law of motion, inertia and mass; Newton's 2^{nd} law of motion, momentum and force; 3^{rd} law of motion, daily life applications of Newton's laws of motion.

November 2023:

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; 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

Lesson Plan

Name of the Extension Lecturer: Ankita

Class and Section:-B.Sc. 3rd SEMESTER (N.M, C.S)

Subject: - PHYSICS (Computer programming and thermodynamics)

OCTOBER 2023

	Topics
1	Thermodynamic system and Zeroth law of thermodynamics. First law of thermodynamics and its limitations, reversible and irreversible process Second law of thermodynamicsand its significance, Carnot theorem, Absolute scale of temperature, Absolute Zero andmagnitude of each division on work scale and perfect gas scale, Joule's free expansion, Joule Thomson effect Joule-Thomson (Porous plug) experiment, conclusions andexplanation, analytical treatment of Joule Thomson effect. Entropy, calculations ofentropy of reversible and irreversible process, T-S diagram, entropy of a perfect gas. Joule-Thomson (Porous plug) experiment, conclusions andexplanation, analytical treatment of Joule Thomson effect. Entropy, calculations ofentropy of reversible and irreversible process, T-S diagram, entropy of a perfect gas. Nernst heat law(third law of thermodynamics), Liquefaction of gases, (oxygen, air,hydrogen and helium), Solidification of He below 4K, Cooling by adiabaticdemagnetization
2	UNIT-4 - Second latent heat equation, specific heat of saturated vapours, phase diagram, Triple point of a substance, development of Maxwell thermodynamic relations, thermo dynamical functions : Internal energy(U).

November 2023

	Topics
1	Helmholtz function (F), Enthalpy (H), Gibbs function (F) and relations between them
	Derivation of Maxwell thermodynamic relations from thermo-dynamical functions, applications of Maxwell relations : Relation between two specific heats of gas, derivation of Clausius-Clapeyron and Clausius equation Variation of intrinsic energy with volume for perfect gas, Vanderwall gas, solids and liquids. Derivation of Stefan's law, adiabatic compression and expansion of gas. Deduction of theory of Joule Thomson effect.
2	UNIT-2 – Algorithm, Flow chart and programming for print out of natural numbers

1	Range of the set of given number, Program for ascending and descending order, mean and standard deviation
	Least square fitting of curve, Program of roots of quadratic equation, product of two matrices, numerical integration(trapezoidal rule and simpson1/3 rule

Ankita

Lesson Plan (WAVES AND OPTICS)

Name of the Assistant Professor: Ramesh Kumar, 2023-24

Class and Section:-B.Sc 3rd SEMESTER (Non-Medical and Computer Science)

Month	TOPICS
August	Introduction to Optics Introduction to interference and Diffraction of light UNIT-1 Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference Fresnel biprism and its applications to determine the wavelength of sodium light and thickness of a mica sheet, Lloyd's mirror, Difference between Bi-prism and Llyod mirror fringes, Stokes relation& numerical
September	UNIT-2 Interference by Division of Amplitude: Plane parallel thin film, production of colors in thin films, non reflecting film, wedge shape thin film, classification of fringes in films, Interference due to transmitted light and reflected light, Newton's rings experiment and its application (UNIT TEST) Interferometer: Michelson's interferometer and its applications to (i) Standardization of a meter (ii) Determination of wavelength.
October	Unit-3Fresnel's diffraction: Fresnel's assumptions and half period zones, rectilinear propagation of light, zone plate, Fresnel's diffraction: Fresnel's assumptions and half period zones, rectilinear propagation of light, zone plate, diffraction at a straight edge, rectangular slit, and circular aperture, wire, numerical, Unit Test Revision
November	Unit-4 Diffraction and its types, Fraunhoffer diffraction: single-slit diffraction, double-slit diffraction N-slit diffraction, plane transmission granting spectrum, dispersive power of grating, limit of resolution UnitTest Rayleigh's criterion, resolving power of telescope and a grating. Differences between prism and grating spectra

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
Aug -2023	Need for Quantum Mechanics, Frank- Hertz experiment, de-Broglie hypothesis. Davisson and Germer experiment
	G.P. Thomson experiment. Phase velocity, group velocity and their relation. Heisenberg's uncertainty principle.
Sept -2023	Time energy and angular momentum, position uncertainty. Uncertainty principle from de Broglie wave. (Wave-particle duality). Gamma Ray Microscope.
	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 -2023	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).
	One dimensional step potential, One dimensional potential barrier
	Solution of Schrodinger equation for harmonic oscillator (quantization of energy, Zero-point energy, wave equation for ground state and excited states).
	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:
Nov- 2023	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).
	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

Name of Assistant Prof. : Dr. Manju Sharma Class: B.Sc (5th Semester)
Subject : Nuclear Physics

Month-2023	Units/Topics Covered
August-2023	**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-2023	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-2023	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, Photonuclear 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-2023	**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

Manju - 1