AKPC MAHAVIDYALAYA

DEPT.OF PHYSICS

SUBHASNAGAR, BENGAI, HOOGHLY, PIN- 712611

COURSE OUTCOME

Class: B.Sc (SEM-I), **Course Code**: GE-1/PHY C-1, **Name of the Course**: Mechanics

Indexing	Name of the topic	COURSE OUTCOME
CO-1.1	**Vectors**	Students are familiar with the following • Vector algebra • Scalar and vector products • Derivatives of a vector with respect to a parameter.
CO-1.2	**Ordinary Differential Equations**	Students are know about • 1st order homogeneous differential equations • 2nd order homogeneous differential equations with constant coefficients.
CO-1.3	**Laws of Motion**	The outcome of the chapter are • Frames of reference • Newton's Laws of motion • Dynamics of a system of particles • Centre of Mass.
CO-1.4	**Momentum and Energy**	From this section students are know about • Conservation of momentum • Work and energy • Conservation of energy • Motion of rockets.
CO-1.5	**Rotational Motion**	This section help the students to know about • Angular velocity and angular momentum. Torque. Conservation of angular momentum.
CO-1.6	**Gravitation**	This portion help the students to know about different things like • Newton's Law of Gravitation • Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved • areal velocity is constant • Kepler's Laws (statement only) • Satellite in circular orbit and applications • Geosynchronous orbits • Weightlessness. Basic idea of global positioning system (GPS).
CO-1.7	**Oscillations**	Students are enriched with the following • Simple harmonic motion • Differential equation of SHM and its solutions

		• Kinetic and Potential Energy • Total Energy and their time averages • Damped oscillations.
CO-1.8	**Elasticity**	Students are well known about • Hooke's law - Stress-strain diagram • Elastic moduli • Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants – • Work done in stretching and work done in twisting a wire – • Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion - Torsional pendulum- • Determination of Rigidity modulus and moment of inertia - q, η and σ by Searles method
CO-1.9	**Special Theory of Relativity**	This section help the students to know about • Constancy of speed of light • Postulates of Special Theory of Relativity • Length contraction • Time dilation • Relativistic addition of velocities.
	LAB	Students can perform the following experiment in laboratory 1. Measurements of length (or diameter) using vernier caliper, screw gauge and traveling microscope. 2. To determine the Moment of Inertia of a Flywheel/ regular shaped objects. 3. To determine Young's Modulus by flexure method. 4. To determine the Young's Modulus of a Wire by Optical Lever Method. 5. To determine the Modulus of Rigidity of a wire by Maxwell's needle / dynamical method. 6. To determine the Elastic Constants of a Wire by Searle's method. 7. To determine g by Bar/ Kater's Pendulum. 8. To determine the coefficient of viscosity by Poiseuille's method. 9. To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of g.

COURSE OUTCOME

Class: B.Sc. (SEM-II), Course Code: PHY-C 2/ GE-2, Name of the Course: Electricity and Magnetism

Indexing	Name of the topic	COURSE OUTCOME
CO-2.1	**Vector Analysis**	Students are able to understand about • Review of vector algebra (Scalar and Vector product) • gradient, divergence, Curl and their significance • Vector Integration, Line, surface and volume integrals of Vector fields • Gauss-divergence theorem and • Stoke's theorem of vectors (statement only).

CO-2.2	**Electrostatics**	This section help the student to know the followings • Electrostatic Field, electric flux • Gauss's theorem of electrostatics and 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. • Electric potential as line integral of electric field, potential due to a point charge • electric dipole, uniformly charged spherical shell and solid sphere • Calculation of electric field from potential • Capacitance of an isolated spherical conductor. • Parallel plate, spherical and cylindrical condenser • Energy per unit volume in electrostatic field • Dielectric medium, Polarisation • Displacement vector • Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.
CO-2.3	**Magnetism**	Students are familiar about • Biot-Savart's law & its applications- straight conductor • circular coil, solenoid carrying current • Divergence and curl of magnetic field • Magnetic vector potential. Ampere's circuital law • Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility • Brief introduction of dia-, para- and ferro-magnetic materials
CO-2.4	**Electromagnetic Induction Matter**	Students are able to understand • Faraday's laws of electromagnetic induction • Lenz's law • self and mutual inductance • L of single coil • M of two coils • Energy stored in magnetic field.
CO-2.5	**Maxwell`s equations and Electromagnetic wave propagation**	This portion help the students to understand about • Equation of continuity of current • Displacement current • Maxwell's equations, Poynting vector, energy density in electromagnetic field • electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves • polarization

	LAB	The following experiment help the students to understand the theory • To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses. • Ballistic Galvanometer: (i) Measurement of charge and current sensitivity (ii) Measurement of CDR • To compare capacitances using De'Sauty's bridge. • To study the Characteristics of a Series RC Circuit. • To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor • To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q • To determine a Low Resistance by Carey Foster's Bridge. • To verify the Thevenin and Norton theorem • To verify the Superposition, and Maximum Power Transfer Theorem • To determine the horizontal component of earth's magnetic field. • To determine the resistance of a suspended coil galvanometer by half deflection method and hence calculate the sensitivity of the galvanometer.

COURSE OUTCOME

Class: B.Sc. (SEM-III), Course Code: PHY-C 3/ GE-3, Name of the Course: THERMAL PHYSICS AND STATISTICAL MECHANICS

Indexing	Name of the topic	COURSE OUTCOME
CO-3.1	**Thermodynamic Description of system**	Students are able to understand about • Zeroth Law of thermodynamics and temperature. • First law and internal energy, • conversion of heat into work, • Various Thermodynamical Processes • Applications of First Law • General Relation between CP and CV, • Work Done during Isothermal and Adiabatic Processes, • Compressibility and Expansion Coefficient,

		• Reversible and irreversible processes, • Second law and Entropy, • Carnot‟s cycle & theorem, • Entropy changes in reversible & irreversible processes, • Entropy-temperature diagrams, • Third law of thermodynamics, • Unattainability of absolute zero.
CO-3.2	**Thermodynamical Potentials**	This section help the student to know the followings • 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 •
CO-3.3	**Kinetic Theory of Gases**	Students are familiar about • Derivation of Maxwell‟s law of distribution of velocities and its experimental verification, • Mean free path (Zeroth Order), • Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), • Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases..
CO-3.4	**Theory of Radiation**	Students are able to understand • Blackbody radiation, • Spectral distribution, • Concept of Energy Density, • Derivation of Planck's law, • Deduction of Wien"s distribution law, • Rayleigh- Jeans Law, • Stefan Boltzmann Law and • Wien’s displacement law from Planck"s law.
CO-3.5	**Statistical Mechanics**	This portion help the students to understand about • Phase space, • Macrostate and Microstate, • Entropy and Thermodynamic probability, • Maxwell-Boltzmann law - distribution of velocity – • Quantum statistics - Fermi-Dirac distribution law – electron gas – • Bose-Einstein distribution law - photon gas – • comparison of three statistics.

	LAB	The following experiments help the students to understand the theory 1. Measurement of Planck's constant using black body radiation. 2. To determine Stefan's Constant. 3. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method. 4. To determine the temperature co-efficient of resistance by Platinum resistance thermometer. 5. To study the variation of thermo emf across two junctions of a thermocouple with temperature. 6. To determine the coefficient of linear expansion by optical lever method. 7. To determine the pressure coefficient of air by constant volume method. 8. To determine the coefficient of linear expansion by travelling microscope. 9. To determine the coefficient of thermal conductivity of a good conductor by Searle's method.

COURSE OUTCOME

Class: B.Sc. (SEM-IV), Course Code: PHY-C 4/ GE-4, Name of the Course: WAVES AND OPTICS

Indexing	Name of the topic	COURSE OUTCOME
CO-4.1	**Superposition of Two Collinear Harmonic oscillations**	Students are able to understand about • Linearity & Superposition Principle. • (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats).
CO-4.2	**Superposition of Two Perpendicular Harmonic Oscillations**	This section help the student to know the followings • Graphical and Analytical Methods. • Lissajous Figures with equal an unequal frequency and their uses.
CO-4.3	**Waves Motion-General**	Students are familiar about • Transverse waves on a string. • Travelling and standing waves on a string. • Normal Modes of a string. • Group velocity,

		• Phase velocity. • Plane waves. • Spherical waves, • Wave intensity
CO-4.4	**Fluids: Surface Tension**	Students are able to understand • Synclastic and anticlastic surface • Excess of pressure • Application to spherical and cylindrical drops and bubbles – • variation of surface tension with temperature – • Jaegar‟s method. Viscosity – • Rate flow of liquid in a capillary tube – • Poiseuille‟s formula – • Determination of coefficient of viscosity of a liquid – • Variations of viscosity of liquid with temperature- lubrication.
CO-4.5	**Sound**	This portion help the students to understand about • Simple harmonic motion – • forced vibrations and resonance – • Fourier's Theorem – • Application to saw tooth wave and square wave – • Intensity and loudness of sound – • Decibels – • Intensity levels – musical notes – musical scale. • Acoustics of buildings: • Reverberation and time of reverberation – • Absorption coefficient – • Sabine‟s formula - measurement of reverberation time – • Acoustic aspects of halls and auditoria.
CO-4.6	**Wave Optics**	Students are able to understand • Electromagnetic nature of light. • Definition and Properties of wave front. Huygens Principle.
CO-4.7	**Interference**	Students are able to understand • Division of amplitude and division of wavefront. • Young's Double Slit experiment. • Lloyd's Mirror and Fresnel's Biprism. • Phase change on reflection: Stokes' treatment. • Interference in Thin Films: parallel and wedge-shaped films. • Fringes of equal inclination (Haidinger Fringes); • Fringes of equal thickness (Fizeau Fringes). • Newton‟s Rings: measurement of wavelength and refractive index.
CO-4.8	**Michelson‟s Interferometer**	This portion help the students to understand about • Idea of form of fringes (no theory needed), • Determination of Wavelength, • Wavelength difference, • Refractive index, and Visibility of fringes.
CO-4.9	**Diffraction**	Students are familiar about • Fraunhofer diffraction- • Single slit;

		• Double Slit. • Multiple slits and Diffraction grating. • Fresnel Diffraction: • Half-period zones. • Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.
CO-4.10	**Polarization**	This portion help the students to understand about • Transverse nature of light waves. • Plane polarized light – production and analysis. • Circular and elliptical polarization.
	LAB	The following experiments help the students to understand the theory 1. To determine the angle of prism by (i) Rotating telescope or (ii) Rotating prism method. 2. To determine the Refractive Index of the Material of a given Prism using Sodium Light. 3. To determine Dispersive Power of the Material of a given Prism using Mercury Light. 4. To determine the value of Cauchy Constants of a material of a prism. 5. To determine the Resolving Power of a Prism. 6. To determine wavelength of sodium light using Newton's Rings. 7. To determine the diameter of a thin wire by Diffraction. 8. To determine wavelength of Sodium light using plane diffraction Grating. 9. To determine the Resolving Power of a Plane Diffraction Grating. 10. To determine the refractive index of a liquid by travelling microscope. 11. To determine the focal length of a concave lens by combination method.

COURSE OUTCOME

Class: B.Sc. (Sem-V), **Course Code:** PHYH-DSE-1A, **Name of the Course:** Elements of Modern Physics

Indexing	Name of the topic	COURSE OUTCOME
DSE-1A.1	Quantum Theory – Advent of Quantum Mechanics	Students are able to know about • Plank's theory, Photo-electric effect, Compton scattering. • De-Broglie wavelengths, Davisson-Germer experiments.

		• Rutherford model, Bohr quantizations.
DSE-1A.2	Quantum Mechanics	Students are able to know about • Wave-particle duality, uncertainty, gamma ray microscope thought experiment. • Interference, two-slit experiments, operators, wavefunctions. • Energy eigenvalues, potential wells, scattering and tunneling.
DSE-1A.3	Atomic Nucleus	Students are able to know about • Nuclear structure, nuclear force, binding energy. • Stability of atoms and radioactivity. • Nuclear reactions, fusions, fissions.
	LAB	The following experiments help the students to understand the theory: • To determine value of Boltzmann constant using V-I characteristic of PN diode. • To determine work function of material of filament of directly heated vacuum diode. • To determine value of Planck's constant using LEDs of at least 4 different colours. • To determine the excitation potential of mercury/argon by Franck-Hertz experiment. • To determine the wavelength of H-alpha emission line of Hydrogen atom. • Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light. • To determine the value of e/m by magnetic focusing. • To determine the band gap by measuring the resistance of a thermistor at different temperature.

COURSE OUTCOME

Class: B.Sc. (Sem-VI), **Course Code:** DSE-1B, **Name of the Course:** Digital and Analog circuits and instrumentation

Indexing	Name of the topic	COURSE OUTCOME
DSE-1B.1	Digital Circuits	Students are able to know about • Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, Or and NOT Gates. NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. • De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuitby (1) Sum of Products Method and (2) Karnaugh Map.
DSE-1B.2.1	Semiconductor Devices and Amplifiers:	Students are able to know about • p and n type semiconductors. PN Junction Diode. • Current Flow Mechanism in Forward and Reverse Biased Diode. • PN junction and its characteristics.Static and Dynamic Resistance. • Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell.
DSE-1B.2.2	Bipolar Junction transistors	Students are able to know about • n-p-n and p-n-p Transistors.

		• Characteristics of CB, CE and CC Configurations. • Active, Cutoff, and Saturation Regions. • Current gains α and β. Relations between α and β. • Load Line analysis of Transistors. DC Load line and Q-point. • Voltage Divider Bias Circuit for CE • Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. • Input and Output Impedance. Current, Voltage and Power Gains. • Class A, B, and C Amplifiers.
DSE-1B.3.1	Operational Amplifiers	Students are able to know about • Characteristics of an Ideal and Practical Op-Amp (IC 741) • Open-loop & Closed-loop Gain.CMRR, concept of Virtual ground. • Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Zero Crossing Detector
DSE-1B.3.2	Sinusoidal Oscillators	• Barkhausen's Criterion for Self-sustained Oscillations. • Determination of Frequency of RC Oscillator
DSE-1B.4.1	Instrumentation	Students are able to know about

		• Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.
DSE-1B.4.2	Power Supply	• Half-wave Rectifiers. Centre-tapped • Bridge Full-wave Rectifiers • Calculation of Ripple Factor and Rectification Efficiency • Basic idea about capacitor filter, Zener Diode and Voltage Regulation
DSE-1B.4.3	Timer IC	• IC 555 Pin diagram and its application as a stable & monostable Multivibrator
	LAB	The following experiments help the students to understand the theory: • To measure (a)Voltage, and (b) Frequency of a periodic wave form using a CRO. • To verify and design AND, OR, NOT and XOR gates using NAND gates. • To minimize a given logic circuit. • Half adder, Full adder and 4-bit Binary Adder. • Adder-Subtractor using Full Adder I.C. • To study I-V characteristics of PN diode and Zener diode. • To study the characteristics of a Transistor in CE configuration. • To design a CE amplifier of a given gain (mid-gain) using voltage divider bias. • To design an inverting amplifier of given gain using an Op-amp 741 and study its frequency response. • To design an non-inverting amplifier of given gain an Op-amp 741 and study its frequency response.