FIRST DEGREE PROGRAMME UNDER CBCSS SCHEME AND

SYLLABI OF COMPLEMENTARY COURSE IN PHYSICS

For First Degree Programme in Mathematics w.e.f. 2018 Admission

Course Code	Sem.	Title of Course	Contact hrs/week	No. of Credits
PY 1131.1	1	Mechanics and Properties of Matter Practical	2 2	3
PY 1231.1	2	Thermal Physics and Statistical Mechanics Practical	2 2	3
PY 1331.1	3	Optics ,Magnetism and Electricity Practical	3 2	4
PY 1431.1 PY 1432	4	Modern Physics and Electronic Practical	3 2	4

Semester 1

PY1131.1 – Mechanics and Properties of matter (36 hours)

Unit I (28 hours)

Dynamics of rigid bodies (7 hours)

Theorems of M.I with proof-Calculation of M.I of bodies of regular shapes rectangular lamina, uniform bar of rectangular cross section, annular disc, circular disc, solid sphere-K.E of a rotating body. Determination of M.I of a fly wheel (theory and experiment).

Oscillations and waves (13 hours)

Examples of S.H oscillator-compound pendulum-determination of g -torsion pendulum-oscillations of two particles connected by a spring-vibration state of a diatomic molecule.

Wave motion-general equation of wave motion-plane progressive harmonic wave -energy density of a plane progressive wave -intensity of wave and spherical waves-

Mechanics of solids (8 hours)

Bending of beams-bending moment-cantilever-beam supported at its ends and loaded in the middle-uniform bending-experimental determination of Y using the above principles with pin and microscope-twisting couple on a cylinder-angle of twist and angle of shear-torsional rigidity, **.**

Unit II (8 hours)

Surface Tension (5 hours)

Excess of pressure on a curved surface-force between two plates separated by a thin layer of liquid-experiment with theory to find surface tension and its temperature dependence by Jaeger' method-equilibrium of a liquid drop over solid and liquid surfaces.

Viscosity (3 hours)

Flow of liquid through a capillary tube-derivation of Poiseuille's formula -limitations-Ostwald's viscometer-variation of viscosity with temperature.

Books for Study

1. Mechanics: J.C.Upadhyaya, Ram Prasad & Sons

2. Oscillations & Waves: K.RamaReddy, S.Bbadami & V.Balasubramaniam (University Press)

Semester 2

PY1231.1 – Thermal Physics and statistical mechanics (36 hours)

Unit I

Transmission of Heat (14 hours)

Thermal conductivity and thermometric conductivity-Lee's disc experiment-Weidmann and Franz law (statement only)-energy distribution in the spectrum of black body and results-Wien's displacement law-Rayleigh-Jeans law-their failure and Planck's hypothesis-Planck's law-comparison-solar constant-its determination-temperature of sun.

Unit II

Thermodynamics (9 hours).

Isothermal and adiabatic processes-work done-isothermal and adiabatic elasticityHeat engines-Carnot's cycle -derivation of efficiency-petrol and diesel engine cycles-efficiency in these two cases-second law of thermodynamics-Kelvin and Clausius statements.

Unit III

Entropy (9 hours)

Concept of entropy-change of entropy in reversible and irreversible cycles-principle of increase of entropy-entropy and disorder-entropy and available energy- T-S diagram for Carnot's cycle-second law in terms of entropy-calculation of entropy when ice is converted into steam.

Unit 4

Statistical Mechanics(4hours)

Statistical probability-Macro and Microstates- Phase space-statistical ensemble-postulates of equal probability-Maxwell Boltzmann Distribution- velocity distribution.

Books for Study

1. Heat & Thermodynamics: N.Subramaniam & Brijlal, S.Chand & Co
2. Heat & Thermodynamics: W.Zemansky, McGraw Hill
3. Heat & Thermodynamics: C.L.Arora.

Semester 3

PY1331.1 – Optics, Magnetism and Electricity (54hours)

Unit I (34 hours)

Interference (12 hours)

Analytical treatment of interference-theory of interference fringes and bandwidth.Interferencein thin films-reflected system-colour of thin films-fringes of equal inclination and equal thickness -Newton's rings-reflected system-measurement of wavelength and refractive index of liquid.

Diffraction (14 hours)

Phenomenon of diffraction-classification-Fresnel and Fraunhofer.Fresnel's theory of approximate rectilinear propagation of light-Fresnel diffraction at a straight edge and circular aperture. Fraunhofer diffraction at a single slit, two slits and N slits. Plane transmission grating-determination of wavelength.

Laser and Fibre Optics (8 hours)

Principle of operation of laser-population inversion-optical pumping-ruby laserapplications of lasers. Light propagation in optical fibres-step index fibre- graded index fibre-applications.

Unit II (20 hours)

Magnetism (10 hours)

Magnetic properties of matter-definition and relation between magnetic vectors B, H and M. Magnetic susceptibility and permeability.Magneticproperties-diamagnetism-paramagnetism-ferromagnetism-antiferromagnetism.Electron theory of magnetism-explanation of ferromagnetism.

Electricity (10 hours)

EMF induced in a coil rotating in a magnetic field-peak, mean, rms and effective values of A.C. Ac circuits-AC through RC, LC, LR and LCR series circuits-resonance-sharpness of resonance-power factor and choke coil-transformers.

Books for Study

1.A text book of optics – Brijlal & Subramaniam

2.Electricity and Magnetism – R.Murugeshan, S.Chand & Co Ltd.

3.A text book of B.Sc subsidiary Physics – P.Vivekanandan.

Semester 4

PY1431.1Modern Physics and Electronics(54hours)

Unit 1.(30 hours)

Modern Physics (20 hours)

Basic features of Bohr atom model-Bohr's correspondence principle -vector atom model-various quantum numbers-magnetic moment of orbital electrons -electron spin-Spin-Orbit coupling-Pauli's exclusion principle-Atomic nucleus-basic properties of nucleus-charge, mass, spin, magnetic moment- binding energy and packing fraction-nuclear forces-salient features-radioactivity- radioactive decay-decay laws-decay constant-half life and mean life-radioactive equilibrium-secular and transient equilibrium-measurement of radioactivity.

Quantum Mechanics (10 hours)

Inadequacies of classical physics-experimental evidences- quantum theory-Planck's hypothesis-foundation of quantum mechanics-wave function and probability density-Schrödinger equation-time dependent and time independent-particle in a potential box.

Unit2.(24 hours)

Electronics(1 6hour)

Current-voltage characteristics of a diode-forward and reverse bias-breakdown mechanism of p -n junction diode-Zener diode and its characteristics-half wave and full wave rectifiers-bridge rectifier-ripple factor, efficiency.

Construction and operation of a bipolar junction transistor-transistor configurationscurrent components-transistor characteristics-DC load line-Q point-AC load linetransistor biasing-need for biasing-bias stabilization-biasing circuits-voltage divider bias. amplifier-basic features of an amplifier-gain, -frequency response and band width

Digital Electronics (8 hours)

Number systems and codes-decimal numbers-binary arithmetic -1's and 2's compliment-decimal to binary conversion-octal numbers-hexadecimal numbers-binary coded decimal-digital codes-logic gates-NOT, OR, AND, NOR and NAND gates. Boolean algebra-Boolean operations -logic expressions-laws of Boolean algebra-DeMorgan's theorem-Boolean expression for gate network-simplification of Boolean expression.

Books for Study:

1. Modern Physics – R.Murugeshan, S.Chand & Co. Ltd.
2. Principles of Electronics – V.K.Mehta.