

Intermediate II YEAR - PHYSICS
(Only S.I.Units are to be adopted)
(With Effect from 2004-2005)

I. SOUND: (12 Periods)

Characteristics of a sound note – Formation of stationary waves in stretched strings – Laws of vibrating strings – Experimental verification by Sonometer – Beats – Definition and explanation – Doppler Effect – Derivation of formula for apparent frequency in specific cases – Applications and limitations of Doppler Effect – Echoes – Absorption of sound waves – Reverberations – Fundamentals of Building acoustics – Statement of Sabine's formula (Qualitative treatment only)

II. RAY OPTICS AND OPTICAL INSTRUMENTS: (15 Periods)

Nature of light – Newton's corpuscular theory – Huygen's wave theory – Electromagnetic wave theory, Properties of Electro-magnetic waves – Quantum theory (Elementary ideas only) — Critical angle – Total internal reflection – Application to Optical fibres. Len's Maker's formula $1/f = (\mu - 1) (1/R_1 + 1/R_2)$ (expression only) – Defects of images – Spherical and Chromatic aberrations and their elimination (Qualitative treatment) – Construction of Ramsden's and Huygen's eyepieces. Dispersion of light – Dispersive Power – Pure and impure spectra – Conditions for obtaining pure spectrum. Different kinds of spectra – Emission spectra-line, band and continuous spectra; Absorption spectra – Their significance; Fraunhofer lines and their significance.

III. PHYSICAL OPTICS: (8 Periods)

Interference – Coherent sources – young's double slit experiment – Applications – Diffraction – phenomenon of diffraction – Fresnel and Fraunhofer Diffraction – Applications - Polarisation – concepts of polarisation – production of plane polarised light by reflection, refraction and double refraction (Polaroids).

IV. MAGNETISM: (10 Periods)

Coulomb's inverse square law – Couple acting on a bar magnet placed in a uniform magnetic field – Magnetic moment of a magnet – Expression for Magnetic induction due to a bar magnet on axial and Equatorial lines – Superposition of magnetic fields – Tangent law – Deflection Magnetometer – Comparison of magnetic moments in Tan-A and Tan-B positions by Equal distance method and null method – Verification of Inverse square law; vibration Magnetometer – Experimental determination of M and H.

V. ELECTROSTATICS: (12 Periods)

Coulomb's Law – Permittivity – concept of electric field – Electric lines of force – Force on a charge in an electric field ($F=Eq$) – Electric potential – Potential due to point charge – potential energy of a point charge in a uniform electric field – electron volt – relation between E and V ($E=V/d$). Capacitance – Dielectric constant – Parallel plate capacitor – mention of formula for capacitance – dielectric materials (Elementary treatment) - effect of dielectric on capacity (Expressions only) – derivation of formulae for resultant capacitance, when capacitors are connected in series and parallel – Energy stored in a capacitor – effect of dielectric on the energy – types of capacitors and their uses.

VI. CURRENT ELECTRICITY: (10 Periods)

Ohm's Law – Ohmic and non-ohmic resistances – specific resistance – conductance – temperature dependence of resistivity – thermistor – emf of a cell – internal resistance and back e.m.f. Kirchoff's laws – statement and explanation – application to wheatstone's bridge for its balance conditions – metre bridge – principle of potentiometer – Comparison of e.m.f. of cell – determination of internal resistance of a primary cell - Series and parallel combination of cells.

VII. THERMOELECTRICITY: (5 Periods)

Seebeck effect – peltier and Thomson effects and their coefficients – variation of thermo e.m.f. with temperature – Neutral and inversion temperatures – application of thermo couples.

VIII. ELECTROMAGNETICS: (20 Periods)

Oersted's experiment – Biot-Savart law – Ampere law – magnetic field near a long straight wire and at the centre of a circular coil carrying current (expressions only) – Tangent galvanometer principle and working – force on a moving charge in a magnetic field – $f = (q.V \times B)$ – force on a current carrying conductor in a magnetic field – force between two straight parallel conductors carrying current – definition of ampere – Fleming's left hand rule-force and torque on current loop in a magnetic field – construction and working of a moving coil galvanometer – shunt and its uses – conversion of moving coil galvanometer into ammeter and voltmeter – Comparison of MCG with T.G. Electromagnetic induction – Magnetic flux and induced emf-Faraday and Lenz's laws – Fleming's right hand rule – self and mutual inductance – Henry – Principle of transformer (Elementary ideas). a.c. current circuits – Introduction – Instantaneous, maximum and r.m.s values of a.c current – growth and decay of current in an inductor – growth and decay of charge in a capacitor – A.C. Circuits – L.C, C.R. and L.C.R. circuits.

IX. ATOMIC PHYSICS: (10 Periods)

Discovery of electron-e/m of electron by Thomson's method – charge of an electron by Millikan's oil drop method (Principle only). Photoelectric effect-laws of photo electric emission – Einstein's Photoelectric equation and its experimental verification by Millikan's method – photo electric cells and their uses. X-ray spectra – Mosley's law and its importance – Compton effect –dual nature of matter – DeBroglie's hypothesis (concepts only)

X. NUCLEAR PHYSICS: (10 Periods)

Composition of nucleus – nuclear forces – mass defect and binding energy (Explanations with examples) – artificial transmutation of elements – Discovery of neutron – nuclear fission – chain reaction – Principle and working of a nuclear reactor – Radio-Isotopes and their uses – Nuclear radiation hazards – Protective shielding – Nuclear fusion – energy of the sun and the stars (Carbon – Nitrogen cycle and Proton – Proton cycle) – elementary particles.

XI. SEMI-CONDUCTOR DEVICES: (8 Periods)

Junction diode – depletion layer – barrier potential – forward and reverse bias – current – voltage characteristics – junction diode as half wave and full wave rectifiers – Zener diode as Voltage regulator. Transistors pnp and npn transistors – Transistor characteristics - Transistor amplifier (common emitter).