

GOVT. AUTONOMOUS COLLEGE, KALABURAGI
DEPARTMENT OF PHYSICS
SYLLABUS FOR PG ENTRANCE EXAMINATION IN PHYSICS

Unit – I

Weightage 20 %

Mechanics: Frames of reference, Conservation laws (energy, linear and angular momentum), Moment of Inertia, Collisions, Single and double rockets, Simple harmonic motion, Damped oscillations. Gravitation: Newton's law of gravitation, Kepler's law, Geosynchronous orbits, GPS.

Properties of Matter: Surface Tension: Definition, Angle of contact, Effect of pressure and temperature on surface tension. Viscosity: Turbulent and streamline flow, Stoke's law, Poiseuille's law. Elasticity: Stress, Strain, Hooke's law, Young's modulus, Bulk modulus, Rigidity modulus, Poisson's ratio.

Thermodynamics: Laws of thermodynamics, Relation between C_p & C_v , Carnot's cycle & theorem, Thermodynamic potentials, Kinetic theory of gases: Molecular velocities, Specific heat of gases, Degrees of freedom. Theory of radiation: Planck's law, Stefan's law, Rayleigh Jeans law, Wien's displacement law.

Unit – II

Weightage 20 %

Electromagnetism: Steady and non-steady currents, Biot-Savart's law, Ampere's law, Faraday's laws of electromagnetic induction, Gauss law and Maxwell's equations, Concept of dipole.

Optics: Coherent sources, Young's double slit experiment, Fresnel's biprism, Newton's rings theory, Fresnel and Fraunhofer diffraction, Dispersion and resolution of a grating, Double refraction in a crystal, Principles of refractive indices, Optical activity.

Lasers: Spontaneous emission, stimulated emission and stimulated absorption, condition for laser action, types of lasers, He-Ne gas laser, Semiconductor lasers, Holography, Optical fibers and their properties.

Unit – III

Weightage 30 %

Special Theory of Relativity: Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Einstein's mass-energy relation.

Atomic & Molecular Physics: Excitation and ionization potentials, Franck-Hertz experiment, Space quantization, Electron spin, Quantum numbers and Pauli's exclusion principle, Stern-Gerlach experiment, Zeeman effect, Continuous and Characteristic X-ray spectra, Mosley's law. Molecular Spectra-Electronic, Vibrational, Rotational motions in a molecule.

Quantum Mechanics: Dual nature of waves and particles, Davison-Germer experiment, Uncertainty principle. Time dependent and time independent Schrodinger wave equation, applications of Schrodinger's equation –Particle in a box, Harmonic oscillator.

Statistical Mechanics: Phase space, Boltzmann equipartition theorem, Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein distribution laws.

Nuclear Physics & Elementary particles: Properties of nucleus, Binding energy of nucleus, nuclear forces, Yukawa theory, Liquid drop and Shell nuclear models, Magic numbers, Radioactive disintegration, Properties of alpha rays, beta rays and gamma rays. Cyclotron, Betatron, GM counter. Classification of elementary particles and anti particles, Four basic interactions in nature, Quark model.

Unit – IV

Weightage 30 %


Crystal Structure: Concept of Lattice, Unit cell, Bravais Lattice, Crystal system, Crystal planes, Miller indices, X-ray diffraction, Bragg's Law, Structure of NaCl.


Band Theory of Solids: Classification of solids, Intrinsic and extrinsic semiconductor, Free electron theory of metals, Expression for electrical conductivity, Ohm's Law, Hall effect.


Superconductivity: Elementary ideas of superconductivity, Meissner effect, Critical magnetic field, Persistent current, High temperature superconductivity, Type-I & Type-II superconductors, Applications of superconductors.


Magnetic Materials: Classification of para, dia, ferromagnetic materials, B-H curve (hysteresis) for magnetic materials, Classification of ferrites, applications.

Digital Electronics: Network theorems: Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, PN junction diode and its I-V characteristics, LED, PNP and NPN transistor characteristics, α and β their relationship, Op-amp: Characteristics, CMRR, Inverting and non-inverting modes, Logic gates, Oscillators.


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