Gautam Buddha University, Greater Noida

Syllabus for Entrance Examination GBU-ET) for B. Sc. (Hons.) Physics

Basic Physical Measurement

Physics-scope; nature of physical laws, Need for measurement: Units of measurement, systems of units; SI units, fundamental and derived units, Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures, Dimensions of physical quantities, dimensional analysis and its applications.

Laws of Motion & Kinematics

Frame of reference, Newton's laws of motion, Motion in a straight line: Position-time graph, speed and velocity, Uniform and non-uniform motion, Motion in a plane, Cases of uniform velocity and uniform acceleration-projectile motion, Dynamics of uniform circular motion; Centripetal force.

Work, Energy and Power

Scalar product of vectors, Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power, Notion of potential energy, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-conservative forces: elastic and inelastic collisions in one and two dimensions.

Gravitation and Motion of System of Particles and Rigid Body

Keplar's laws of planetary motion, Acceleration due to gravity and its variation with altitude and depth, Gravitational potential energy, Escape velocity, Centre of mass of a two-particle system, momentum conversation and centre of mass motion, Centre of mass of a rigid body, moment of a force, torque, angular momentum, conservation of angular momentum, Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration, Values of moments of inertia for simple geometrical objects, Statement of parallel and perpendicular axes theorems and their applications.

Properties of Bulk Matter

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow, Bernoulli's theorem and its applications, Surface energy and surface tension, application of surface tension.

Kinetic Theory of Gases and Thermodynamics

Kinetic theory of gases; assumptions, concept of pressure, Kinetic energy and temperature; rms speed of gas molecules, degrees of freedom, law of equipartition of

energy (statement only) and application to specific heats of gases, concept of mean free path, Avogadro's number, Heat, temperature, thermal expansion, specific heat; change of state – latent heat, Heat transfer; conduction, convection and radiation, thermal conductivity, Thermal equilibrium and definition of temperature (zeroth law of thermodynamics), Heat, work and internal energy, First law of thermodynamics, Second law of thermodynamics, reversible and irreversible processes, Equation of state of a perfect gas.

Waves & Optics

Simple harmonic motion (S.H.M) and its equation; energy in S.H.M.; kinetic and potential energies, simple pendulum, resonance, Wave motion, Longitudinal and transverse waves, Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, Doppler effect, Reflection & Refraction of light, total internal reflection and its applications, optical fibres, lenses, Magnification, power of a lens, Refraction and dispersion of light through a prism, Scattering of light, Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers, Wave optics; wave front and Huygen's principle, reflection and refraction of plane wave at a plane surface using wave fronts, Proof of laws of reflection and refraction using Huygens' principle, Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light, Diffraction due to a single slit, width of central maximum, Resolving power of microscopes and astronomical telescopes, Polarisation, plane polarised light; Brewster's law.

Electrostatics

Electric Charges; Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges, superposition principle and continuous charge distribution, Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole, torque on a dipole in uniform electric field, Electric flux, statement of Gauss's law and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside), Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges, Conductors and insulators, free charges and bound charges inside a conductor, Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor.

Current and Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity, series and parallel combinations of resistors; temperature dependence of resistance, Internal resistance of a cell, potential difference and emf of a cell, Kirchhoff's laws and simple applications, Wheatstone bridge, metre bridge, Potentiometer - principle and its applications to measure potential difference and for comparing emf of two cells, measurement of internal resistance of a cell.

Magnetism and Electromagnetic Induction

Concept of magnetic field, Biot - Savart law and its application to current carrying circular loop, Ampere's law and its applications to infinitely long straight wire, straight and toroidal solenoids, Force on a moving charge in uniform magnetic and electric fields, Force on a current-carrying conductor in a uniform magnetic field, Torque experienced by a current loop in uniform magnetic field; Para-, dia- and ferro - magnetic substances with examples, Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy Currents, Self and mutual inductance.

Electromagnetic waves

Electromagnetic waves and their characteristics (qualitative ideas only), Transverse nature of electromagnetic waves, Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.

Fundamentals of Modern Physics

Rutherford's model of atom, Bohr model, energy levels, hydrogen spectrum, Composition and size of nucleus, atomic masses, isotopes, isobars; isotones, Radioactivity; alpha, beta and gamma particles/rays and their properties; radioactive decay law, Mass-energy relation, mass defect, binding energy per nucleon and its variation with mass number; nuclear fission and fusion, Dual nature of radiation, Photoelectric effect, Einstein's photoelectric equation; particle nature of light, Matter waves-wave nature of particles, de Broglie relation, Davisson-Germer experiment.

Electronic Devices and Communication Systems

Semiconductors; semiconductor diode, I-V characteristics in forward and reverse bias, diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode, Zener diode as a voltage regulator, Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator, Logic gates (OR, AND, NOT, NAND and NOR), Transistor as a switch, Elements of a communication system (block diagram only); bandwidth of signals (speech, TV and digital data); bandwidth of transmission medium.

ENGLISH PROFICIENCY

Comprehension, Vocabulary, Basic English Grammar (like usage of correct forms of verbs, prepositions and articles), Word power, Synonyms and Antonyms, Meanings of words and phrases, Technical writing

GENERAL AWARENESS

Current Affairs of National and International Economy, History, Sports News, Science in everyday life, Politics, Geography, Culture, Economics, Trade Awareness, Personalities in News, Indian Constitution