

## Syllabus For Physics (NEET)

### Class XI syllabus

#### **UNIT 1: PHYSICAL WORLD AND MEASUREMENT**

Physics: Scope & excitement; nature law of physical laws; technology & society.

Need of measurement: Units of measurement, system of units, SI units, fundamental and derived units, length mass & measurement, accuracy & precision of measuring instruments, errors in measurement, significant figures

Dimensions of physical quantities, dimensional analysis, and its applications

#### **UNIT 2: KINEMATICS**

The frame of reference, motion in a straight line, Position- time graph, speed and velocity; Uniform and non-uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity-time, position-time graph, relations for uniformly accelerated motion

Elementary concepts of differentiation and integration for describing motion. Scalars and Vectors quantities: position & displacement vectors, general vectors, equality of vectors, multiplication of vectors by real numbers, addition and subtraction of vectors. Relative velocity.

Unit Vector: Resolution of vector in plane rectangular component

Scalar and vector product: motion in plane, case of uniform velocity and uniform acceleration, projectile motion, uniform circular motion

### **UNIT 3: LAWS OF MOTION**

Force and inertia, Newton's First law of motion; Momentum, Newton's Second Law of motion, Impulses; Newton's Third Law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and Kinetic friction, laws of friction, rolling friction.

Dynamics of uniform circular motion: centripetal force and its applications.

### **UNIT 4: WORK, ENERGY, AND POWER**

Work done by a constant force and a variable force; kinetic and potential energies, work-energy theorem, power.

The potential energy of spring conservation of mechanical energy, conservative and nonconservative forces; Elastic and inelastic collisions in one and two dimensions.

### **UNIT 5: MOTION OF SYSTEM OF PARTICLES AND RIGID BODY**

Centre of the mass of a two-particle system, Centre of the mass of a rigid body; Basic concepts of rotational motion;

Moment of a force; torque, angular momentum with some examples

Equilibrium of rigid bodies: Rigid body rotation equations of rotational motion, comparison of linear and rotational motion; the moment of inertia, the radius of gyration. Values of MI for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications

### **UNIT 6: GRAVITATION**

Kepler's law of planetary motion. The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth.

Gravitational potential energy; gravitational potential. Escape velocity, Orbital velocity of a satellite. Geo stationary satellites.

### **UNIT 7: PROPERTIES OF BULK MATTER**

Elastic behaviour, Stress-strain relationship, Hooke's Law. Young's modulus, bulk modulus, modulus of rigidity. Pressure due to a fluid column; Pascal's law and its applications. Viscosity. Stokes' law. terminal velocity, streamline, and turbulent flow. Reynolds number. Bernoulli's principle and its applications. Surface energy and surface tension, angle of contact, application of surface tension - drops, bubbles, and capillary rise. Heat, temperature, thermal expansion; specific heat capacity, calorimetry; change of state, latent heat. Heat

transfer-conduction, convection, and radiation. Newton's law of cooling.

## **UNIT 8: THERMODYNAMICS**

Thermal equilibrium, zeroth law of thermodynamics, the concept of temperature. Heat, work, and internal energy. The first law of thermodynamics.

Second law of thermodynamics: reversible and irreversible processes. Carnot engine and its efficiency.

## **UNIT 9: BEHAVIOUR OF PERFECT GAS AND KINETIC THEORY**

Equation of state of a perfect gas, work done on compressing a gas

Kinetic theory of gases - assumptions, the concept of pressure. Kinetic energy and temperature: RMS speed of gas molecules: Degrees of freedom. Law of equipartition of energy, applications to specific heat capacities of gases; Mean free path. Avogadro's number.

## **UNIT 10: OSCILLATIONS AND WAVES**

Periodic motion - period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (S.H.M.) and its equation; phase: oscillations of a spring -restoring force and force constant: energy in S.H.M. - Kinetic and potential energies; Simple pendulum - derivation of expression for its time period: Free, forced and damped oscillations, resonance.

Wave motion. Longitudinal and transverse waves, speed of a wave. Displacement relation for a progressive wave. Principle of superposition of waves, a reflection of waves. Standing waves in strings and organ pipes, fundamental mode and harmonics. Beats. Doppler Effect in sound

## Class XII Syllabus

### **UNIT 1: ELECTROSTATICS**

**Electric charges:** Conservation of charge. Coulomb's law forces 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 a uniform electric field.

**Electric flux.** Gauss's law and its applications to find field due to infinitely long uniformly charged straight wire, uniformly charged infinite plane sheet, and uniformly charged thin spherical shell. Electric potential and its calculation for a point charge, electric dipole and system of charges; Equipotential surfaces, Electrical potential energy of a system of two point charges in an electrostatic field.

**Conductors and insulators.** Dielectrics and electric polarization, capacitor, the combination of capacitors in series and parallel, capacitance of a parallel plate capacitor with and without

dielectric medium between the plates. Energy stored in a capacitor.

## **UNIT 2: CURRENT ELECTRICITY**

**Electric current.:** The flow of electric charges in metallic conductor, drift velocity & mobility and their relation with electric current; Ohm's law, electric resistance, VI characteristics (linear & non linear), electric energy & power, electric resistivity & conductivity.

Carbon resistors, colour code for carbon resistors, series & parallel combinations of resistors, temperature dependence of resistance

Internal resistance of cell, potential difference and emf of cell, combination of cell in parallel & in series

Kirchhoff's laws and their applications. Wheatstone bridge. Metre Bridge.

Potentiometer - principle and its applications, measurement of internal resistance of a cell

## **UNIT 3: MAGNETIC EFFECTS OF CURRENT AND MAGNETISM**

Concept of magnetic field. Oestward's experiment. 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 moving charge in uniform magnetic and electric fields. Cyclotron.

Force on a current-carrying conductor in a uniform magnetic field. The force between two parallel currents carrying conductors-definition of ampere. Torque experienced by a current loop in a uniform magnetic field: Moving coil galvanometer, its current sensitivity, and conversion to ammeter and voltmeter.

Current loop as a magnetic dipole and its magnetic dipole moment. Bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements.

Para-, dia- and ferromagnetic substances.

Electromagnetic and factors affecting their strengths and permanent magnets.

#### **UNIT 4: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS**

**Electromagnetic induction:** Faraday's law. Induced emf and current: Lenz's Law, Eddy currents. Self and mutual inductance.

Alternating currents, peak and RMS value of alternating current/ voltage: reactance and impedance: LCR series circuit, resonance: Quality factor, power in AC circuits, wattless current.

AC generator and transformer.

## **UNIT 5: ELECTROMAGNETIC WAVES**

Need for displacement current

Electromagnetic waves and their characteristics, Transverse nature of electromagnetic waves,

Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet. X-rays. Gamma rays), including elementary facts about their uses

## **UNIT 16: OPTICS**

Reflection of light, spherical mirrors, mirror formula, refraction of light at plane and spherical surfaces, mirror formula. Total internal reflection and its applications. Deviation and Dispersion of light by a prism; Lens Formula. Magnification. Power of a Lens. Refraction and dispersion of light through a prism

Scattering of light: blue colour of sky & reddish appearance of sun at sunrise & sunset

Optical instruments: human eye, image formation & accommodation, correction of eye defects (myopia & hypermyopia) using lenses

Microscope and Astronomical Telescope (reflecting and refracting ) and their magnifying powers.



Wave optics: wavefront and Huygens' principle.

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. Polarization, plane polarized light: Brewster's law, uses of plane polarized light and Polaroid.

## **UNIT 7: DUAL NATURE OF MATTER AND RADIATION**

Photoelectric effect. Hertz and Lenard's observations; Einstein's photoelectric equation: particle nature of light.

Matter waves-wave nature of particle, de Broglie relation. Davisson-Germer experiment (experimental details should be omitted, only conclusion should be explained)

## **UNIT 18: ATOMS AND NUCLEI**

Alpha-particle scattering experiment; 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.

## **UNIT 9: ELECTRONIC DEVICES**

Energy bands in solids (qualitative idea only), conductors, insulators & Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier; I-V characteristics of LED. the 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.