



# DRAVID OPEN SECONDARY AND HIGHER SECONDARY EDUCATION COUNCIL

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## SYLLABUS PHYSICS

### CLASS 12 PHYSICS SYLLABUS

Part – I

Unit I: Electrostatics

1. Electric Charges and Fields

- Electric charges, conservation of charge
- Coulomb's law, force between point charges
- Electric field, field lines, electric dipole
- Electric flux, Gauss's theorem and applications

2. Electrostatic Potential and Capacitance

- Potential due to point charge, dipole and system of charges
- Equipotential surfaces
- Electric potential energy of charges
- Conductors and insulators, dielectrics and polarization
- Capacitors, capacitance of parallel plate capacitor
- Energy stored in capacitor, combination of capacitors

Unit II: Current Electricity

- Electric current, drift velocity, mobility, Ohm's law
- Resistivity, conductivity, colour code of resistors
- Combination of resistors, series and parallel
- Heating effect of current, Electric power
- Kirchhoff's laws, Wheatstone bridge, Meter bridge
- Potentiometer and its applications

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Unit III: Magnetic Effects of Current and Magnetism

- Biot-Savart's law, Ampere's circuital law

- Force on moving charge, force on current-carrying wire
- Motion in magnetic field, cyclotron
- Magnetic dipole, magnetic field due to dipole
- Torque on magnetic dipole, bar magnet as equivalent solenoid
- Earth's magnetic field and elements
- Magnetic properties of materials (para-, dia-, ferro-)

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#### Unit IV: Electromagnetic Induction and Alternating Currents

- Faraday's laws, Lenz's law, eddy currents
- Self and mutual inductance
- AC generator
- Peak and RMS values of AC current/voltage
- Reactance, impedance, LC oscillations
- Series LCR circuit, resonance, power in AC circuits
- Transformer

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#### Unit V: Electromagnetic Waves

- Displacement current
- Electromagnetic waves and their characteristics
- Electromagnetic spectrum (radio, microwave, IR, visible, UV, X-ray, gamma-ray)

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### Part – II

#### Unit VI: Optics

##### 1. Ray Optics and Optical Instruments

- Reflection, refraction, Snell's law, total internal reflection
- Refraction through spherical lenses, lensmaker's formula
- Magnification, power of lens
- Combination of lenses, microscope, telescope

## 2. Wave Optics

- Huygens' principle, superposition
- Interference of light – Young's double slit experiment
- Diffraction, resolving power of microscope & telescope
- Polarization, Brewster's law

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## Unit VII: Dual Nature of Radiation and Matter

- Photoelectric effect, experimental study
- Einstein's equation of photoelectric effect
- Matter waves, de Broglie hypothesis
- Davisson–Germer experiment

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## Unit VIII: Atoms and Nuclei

### 1. Atoms

- Rutherford's model, Bohr's model of hydrogen atom
- Spectral series of hydrogen atom

### 2. Nuclei

- Composition of nucleus, mass number, isotopes, isobars
- Nuclear forces, radioactivity
- Alpha, beta, gamma decay
- Mass–energy relation, nuclear binding energy
- Nuclear fission and fusion

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## Unit IX: Electronic Devices

- Semiconductor diode (p-n junction), I–V characteristics
- Diode as rectifier
- Zener diode and voltage regulation

- Junction transistor – characteristics and applications
- Logic gates (OR, AND, NOT, NAND, NOR)
- Simple amplifiers

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#### Unit X: Communication Systems

- Elements of communication system
- Propagation of electromagnetic waves (ground wave, sky wave, space wave)
- Modulation and its need
- Amplitude modulation

