

Odisha Board Class 12 Physics Syllabus

10+10

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PHYSICS

(Theory)

+2, 2nd Year Science

(Detailed Syllabus)

No. of Periods yearly – 160

Unit-I Electrostatics

(22 Periods)

1. Electric charges and fields:

Electric charge and its quantization, conservation of charge, Coulomb's law, force between two point charges, force between multiple charges, superposition principle, Continuous charge distribution.

Electric field due to a point charge, electric field lines, electric field due to a dipole at any point , torque on a dipole in uniform electric field.

Electric flux, Gauss's theorem (statement only) and its applications to find field due to uniformly charged infinite plane sheet, infinitely long straight wire and uniformly charged thin spherical shell (field inside and outside).

2. Electrostatic potential and capacitance:

Electric potential, potential difference, electric potential due to a point charge, potential due to a dipole, potential due to a system of charges. Equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field.

Conductors, insulators, free charges and bound charges inside a conductor, Dielectrics and electric polarization, capacitors and capacitance, capacitance of a parallel plate capacitor with

and without dielectric medium between the plates, combination of capacitors in series and in parallel energy stored in a capacitor.

Unit- II Current Electricity: (20 Periods)

Electric current, drift velocity, mobility and their relation with electric current, Ohm's law, electrical resistance, conductance, resistivity, conductivity, effect of temperature on resistance, $V \propto I$ characteristics (linear and non-linear), electrical energy and power, carbon resistors, colour code of carbon resistors, combinations of resistors in series and parallel.

EMF and potential difference, internal resistance of a cell, combination of cells in series and parallel, Kirchhoff's laws and simple applications. Wheatstone bridge and meter bridge. Potentiometer-Principle and its applications to measure potential difference and for comparing EMF of two cells; measurement of internal resistance of a cell.

Unit-III Magnetic effect of Current and magnetism: (22 Periods)

1. Moving charges and magnetism:

Concept of magnetic field, Oersted's experiment, Biot-Savart law and its application to find magnetic field on the axis and at the centre of a current carrying circular loop, Ampere's law and its application to infinitely long straight wire. Straight and toroidal solenoid (qualitative treatment only); Force on a moving charge in uniform magnetic and electric fields, Cyclotron.

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

2. Magnetism and matter :

Current loop as a magnetic dipole and its magnetic dipole moment, magnetic dipole moment of a revolving electron, magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, torque on a magnetic dipole (bar magnet) in a uniform magnetic field, bar magnet as an equivalent solenoid, magnetic field lines, earth's magnetic field and magnetic elements.

Para-, dia- and ferro- magnetic substances with examples, Electromagnets and factors affecting their strengths, permanent magnets.

Unit-IV Electromagnetic induction and Alternating current: (20 Periods)

1. Electromagnetic induction :

Faraday's laws of electromagnetic induction, induced EMF and current, Lenz's law, Eddy currents, self and mutual induction.

2. Alternating Current:

Alternating currents, peak and RMS value of alternating current / voltage, reactance and impedance, LC oscillation (qualitative idea only), LCR series circuit, resonance, power in AC circuits, wattles current, A.C. generator and transformer.

Unit-V Electromagnetic waves: (04 Periods)

Basic idea of displacement current, qualitative idea about characteristics of electromagnetic waves, their transverse nature.

Electromagnetic spectrum (radio waves, microwaves, infrared, visible, Ultra violet, X-ray and gamma rays), including elementary ideas about their uses.

Unit-VI Optics (25 Periods)

1. Ray optics and optical instruments:

Reflection of light, spherical mirrors, mirror formula, lateral and longitudinal magnification, refraction of light, refractive index, its relation with velocity of light (formula only) total internal reflection and its applications, optical fibre, Refraction at spherical surfaces, thin lens formula, lens makers formula, magnification, power of lenses, combination of two thin lenses in contact, combination of a lens and a mirror, refraction and dispersion of light through prism;

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

Optical instruments: microscopes and telescopes (reflecting and refracting) and their magnifying powers.

2. Waves Optics :

Wave front, Huygen's principle, reflection and refraction of plane wave at a plane surface using wavefronts, proof of laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources, sustained interference of light, diffraction due to a single slit, width of a central maximum, resolving power of microscope and astronomical telescope (qualitative idea), polarization, plane polarized light, Brewster's law, uses of plane polarized light and polaroids.

Unit-VII Dual nature of Radiation and matter: (08 Periods)

Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations, Einstein's photoelectric equation, particle nature of light.

Matter waves- wave nature of particles, de-Broglie relation, Davisson- Germer experiment, (only conclusions should be explained).

Unit-VIII Atoms and Nuclei (14 Periods)

1. Atoms:

Alpha- particle scattering experiment, Rutherford's model of atom, its limitations, Bohr model, energy levels, hydrogen spectrum.

2. Nuclei:

Atomic nucleus, its composition, size, nuclear mass, nature of nuclear force, mass defect, binding energy per nucleon and its variation with mass number, nuclear fission, fusion, Radioactivity, alpha, beta and gamma particles/ rays and their properties, radioactive decay law, half life and decay constant.

Unit-IX Semiconductor electronics: (15 Periods)

Energy bands in conductors, semiconductors and insulators (qualitative idea only), p-type, n-type semiconductors, semiconductor diode, V-I characteristics in forward and reverse bias, diode as a half and full wave rectifier (centre tap), efficiency (no derivation).

Special purpose p-n junction diodes: LED, photodiode, solar cell and Zener diode and their characteristics, Zener diode as a voltage regulator.

Junction transistor, transistor action, Characteristics of transistor, transistor as an amplifier (CE configuration), basic idea of analog and digital signals, Logic gates (OR, AND, NOT, NAND, and NOR)

Unit-X Communication System: (10 Periods)

Elements of a communication system (block diagram only), bandwidth of signals (speech, TV and digital data), bandwidth of transmission medium, propagation of electromagnetic waves in the atmosphere, sky and space wave propagation, satellite communication, Need for modulation, qualitative idea about amplitude modulation and frequency modulation, advantages of frequency modulation over amplitude modulation, basic idea about internet, mobile telephony and global positioning system (GPS).

Books Recommended:

1. Physics; Class-XII, Part-I and Part-II published by NCERT.
2. Bureau's Higher Secondary (+2) Physics Vol.-II, published by Odisha State Bureau of Text Book Preparation and Production; Bhubaneswar

UNIT WISE MARK DISTRIBUTION (Physics Theory)

Time- 3 hours

Max. Marks.-70

Units	Subjects	Marks
Unit-I	Electrostatics	15
Unit-II	Current Electricity	
Unit-III	Magnetic Effects of Current and Magnetism	16
Unit-IV	Electromagnetic Induction and Alternating Currents	
Unit-V	Electromagnetic Waves	17
Unit-VI	Optics	
Unit-VII	Dual Nature of Radiation and Matter	10
Unit-VIII	Atoms and Nuclei	
Unit-IX	Semiconductor Electronics	12
Unit-X	Communication Systems	
Total		70

QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Question	Total Marks
VSA	1	14	14
SA-I	2	7	14
SA-II	3	7	21
LA	7	3	21
TOTAL			26 70

[VSA-Very Short Answer, Sa-Short Answer, A-Long Answer.]

- Internal Choice : There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 7 marks weightage.
- The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.