

Units	Topic/ Portion Deleted
Unit I: Electrostatics	Application of Gauss theorem to find field due to uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field-inside and outside). Van de Graff generator.
Unit II: Current Electricity	Carbon resistors, colour code for carbon resistors. Series and parallel combinations of resistors. Measurement of internal resistance of a cell.
Unit III: Magnetic Effects of Current and Magnetism	Cyclotron. 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. Para-, dia-, and ferro- magnetic substances, with examples. Electromagnets and factors affecting their strengths. Permanent magnets.
Unit IV: Electromagnetic Induction and Alternating Currents	Power factor, wattless current
Unit V: Electromagnetic Waves	Basic idea of displacement current. (Need for displacement current.)
Unit VI: Optics	Reflection of light, spherical mirrors, mirror formula.. Scattering of light — blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Human eye, image formation and accommodation, correction of eye defects (myopia and hypermetropia) using lenses. Resolving power of microscopes and astronomical telescopes. Polarisation, plane polarised light; Brewster's law, uses of plane polarised light and Polaroids.
Unit VII: Dual Nature of Matter and Radiation	Davisson-Germer experiment.
Unit VIII: Atoms and Nuclei	Radioactivity — alpha, beta and gamma particles/rays and their properties; radioactive decay law. Binding energy per nucleon and its variation with mass number
Unit IX : Electronic Devices	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.
Unit X: Communication Systems	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. Need for modulation-Production and detection of an amplitude-modulated wave.

Section A

Activities

1. To measure the resistance and impedance of an inductor with or without iron core.
2. To measure resistance, voltage (ac/dc), current (ac) and check continuity of a given circuit using multimeter.
3. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.
4. To assemble the components of a given electrical circuit.
5. To study the variation in potential drop with length of a wire for a steady current.
6. To draw the diagram of a given open circuit comprising at least a battery, resistor/rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram.

Section B

Activities

1. To identify a diode, an LED, a transistor, and IC, a resistor and a capacitor from mixed collection of such items.
2. Use of multimeter to (i) identify base of transistor, (ii) distinguish between npn and pnp type a transistors, (iii) see the unidirectional flow of current in case of a diode and an LED, (iv) check whether a given electronic component (e.g. diode, transistor or IC) is in working order.
3. To study effect of intensity of light (by varying distance of the source) on an LDR.
4. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.
5. To observe polarization of light using two polaroids.
6. To observe diffraction of light due to a thin slit.
7. To study the nature and size of the image formed by (i) convex lens (ii) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror).
8. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.

PHYSICS
COURSE STRUCTURE
Class 12 (Theory)

One Paper		Time 3 Hours	Max. Marks: 70
Units	Titles		Weightage
I	Electrostatics		10
II	Current Electricity		09
III	Magnetic Effect of Current & Magnetism		07
IV	Electromagnetic Induction and Alternating Current		10
V	Electromagnetic Waves		04
VI	Optics		16
VII	Dual Nature of Matter		05
VIII	Atoms and Nuclei		05
IX	Electronic Devices		04
	Total		70

Unit I: Electrostatics

Electric charges and their conservation. 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 a uniform electric field.

Electric flux, statement of Gauss's theorem- and its applications to find field due- to infinitely long straight wire.

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

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

Unit II: Current Electricity.

Electric current, flow of electric charges in a metallic conductor drift velocity and 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. Temperature dependence of resistance.

Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel.

Kirchhoff -'s laws and simple applications. Wheatstone bridges, metre bridge. (Qualitative ideas only).

Potentiometer – principle and applications to measure potential difference, and for comparing emf of two cells. (Qualitative ideas only).

Unit III: Magnetic Effects of Current and Magnetism

Concept of magnetic field, Oersted'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. (only qualitative treatment).

Force - on a moving charge in uniform magnetic and electric fields.

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 a 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. Magnetic dipole moment of a revolving electron, bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements.

Unit IV: 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; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits.

AC generator and transformer

Unit V: Electromagnetic Waves

Electromagnetic waves and their characteristics-Transverse nature of electromagnetic waves (qualitative ideas only).

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

Unit VI: Optics

Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, combination of thin lenses in contact combination of a lens and a mirror. Refraction and dispersion of light through a prism.

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

Wave optics: Wavefront and Huygens' principle, reflection and refraction of plane wave at a plane surface using wavefronts.

Proof of laws of reflection and refraction using Huygens' principle.

Interference, Young's double hole experiment and expression for fringe width, coherent sources and sustained interference of light.

Diffraction due to a single slit, width of central maximum.

Unit VII: Dual Nature of Matter and Radiation

Photoelectric effect, Hertz and Lenard's observations (Experimental study of photoelectric effect); Einstein's photoelectric equation –particle nature of light.

Matter waves — wave nature of particles, de Broglie relation.

Unit VIII: 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.

Mass-energy relation, mass defect; nuclear fission and fusion.

Unit IX : Electronic Devices

Energy bands in solids, conductors, insulators and semiconductors(qualitative ideas only); semiconductor diode — I - V characteristics in forward and reverse bias, diode as a rectifier.

Special purpose p-n junction diodes: LED, photodiode, solar cell.



Sample Blue Print : Physics - 12

Forms of Question/ Topic	Knowledge			Understanding			Application			HOTS			Total			
	Obj	SA I	SA II	LA	SA I	SA II	LA	Obj	SA I	SA II	LA	Obj		SA I	SA II	LA
Electrostatics	1(1)						5(1)					1(1)				10(4)
Current Electricity		2(1)				3(1)		1(1)								9(4)
Magnetic Effects of Current and Magnetism		2(1)						1(1)								7(4)
Electromagnetic Induction and Alternating Current			3(1)				5(1)						2(1)			10(3)
Electromagnetic Waves		2(1)										2(2)				4(3)
Optics			3(1)			3(1)		1(1)				2(1)			5(1)	16(6)
Dual Nature of Matter			3(1)									2(2)				5(3)
Atoms and Nuclei			3(1)									1(1)				5(3)
Electronic Devices	2(2)								2(1)							4(3)
Sub - total	3(3)	6(3)	12(4)		3(3)	2(1)	6(2)	10(2)	5(5)	2(1)	9(3)	5(1)	3(3)	4(2)		70(33)
Total		21(10)		21(8)		21(10)		7(5)								

Note : 1) The figures in the bracket denotes the number of questions

2) This is only a sample Blue Print. The question setter may develop his/her own Blue Print as per the question design

PRACTICALS

Class 12

Every student will perform at least 8 experiments (from any section).

Section A

Experiments

1. To find resistance of a given wire using metre bridge and hence determine the specific resistance of its material.
2. To determine resistance per cm of a given wire by plotting a graph of potential difference versus current.
3. To verify the laws of combination (series/parallel) of resistances using a metre bridge.
4. To compare the emf's of two given primary cells using potentiometer.
5. To determine the internal resistance of a given primary cell using potentiometer.
6. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.
7. To convert the given galvanometer (of known resistance of figure of merit) into an ammeter and voltmeter of desired range and to verify the same.
8. To find the frequency of the ac mains with a sonometer.

Section B

Experiments

1. To find the value of v for different values of u in case of a concave mirror-and to find the focal length
2. To find the focal length of a convex mirror, using a convex lens.
3. To find the focal length of a convex lens by plotting graphs between u and v or between $1/u$ and $1/v$.
4. To find the focal length of a concave lens, using a convex lens.
5. To determine angle of minimum deviation for a given prism by plotting a graph between the angle of incidence and the angle of deviation.
6. To determine refractive index of a glass slab using a travelling microscope.
7. To find refractive index of a liquid by using (i) concave mirror, (ii) convex lens and plane mirror.
8. To draw the I-V characteristics curves of a p-n junction in forward bias and reverse bias.
9. To draw the characteristics curve of a zener diode and to determine its reverse break down voltage.
10. To study the characteristics of a common-emitter npn or pnp transistor and to find out the values of current and voltage gains.