SYLLABUS – 2023-2024
CLASS XII
SUBJECT: PHYSICS (THEORY)
COURSE STRUCTURE

Time: 3 hrs.   **Maximum Marks: 70**

UNIT	TOPICS	MARKS
Unit–I	**Electrostatics**	
	Chapter–1: Electric Charges and Fields	
	Chapter–2: Electrostatic Potential andCapacitance	16
Unit-II	**Current Electricity**	
	Chapter–3: Current Electricity	
Unit-III	**Magnetic Effects of Current and Magnetism**	
	Chapter–4: Moving Charges and Magnetism	
	Chapter–5: Magnetism and Matter	
Unit-IV	**Electromagnetic Induction and Alternating Currents**	17
	Chapter–6: Electromagnetic Induction	
	Chapter–7: Alternating Current	
Unit–V	**Electromagnetic Waves**	
	Chapter–8: Electromagnetic Waves	
Unit–VI	**Optics**	18
	Chapter–9: Ray Optics and Optical Instruments	
	Chapter–10: Wave Optics	
Unit–VII	**Dual Nature of Radiation and Matter**	
	Chapter–11: Dual Nature of Radiation andMatter	
Unit–VIII	**Atoms and Nuclei**	12
	Chapter–12: Atoms	
	Chapter–13: Nuclei	
Unit–IX	**Electronic Devices**	
	Chapter–14:Semiconductor Electronics:Materials,Devices and Simple Circuits	7
Total		**70**

Unit I: Electrostatics
Chapter–1: Electric Charges and Fields

Electric Charges, Conservation of charge, Coulomb's law-force between twopoint-charges, forces between multiple charges; superposition principle andcontinuous charge distribution.

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

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

Chapter–2: Electrostatic Potential and Capacitance

Electric potential, potential difference, electric potential due to a point charge,a dipole and system of charges; equipotential surfaces, electrical potentialenergy of a system of two-point charges and of electric dipole in anelectrostatic field.

Conductors and insulators, free charges and bound charges inside aconductor.

Dielectrics and electric polarisation, capacitors and capacitance,combination of capacitors in series and in parallel, capacitance of a parallelplate capacitor with and without dielectric medium between the plates, energystored in a capacitor (no derivation, formulae only).

Unit II: Current Electricity
Chapter–3: Current Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity,mobility and their relation with electric current; Ohm's law, electricalresistance, V-I characteristics (linear and non-linear), electrical energy andpower, electrical resistivity and conductivity, temperaturedependence of resistance.

Internal resistance of a cell, potential difference and emf of a cell, combinationof cells in series and in parallel, Kirchhoff's rules,Wheatstone bridge.

Unit III: Magnetic Effects of Current and Magnetism
Chapter–4: Moving Charges 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 solenoids, force on a moving charge inuniform magnetic and electric fields.

Force on a current-carrying conductor in a uniform magnetic field, forcebetween two parallel current-carrying conductors-definition of ampere, torqueexperienced by a current loop in uniform magnetic field; Current loop as a magnetic dipole and its magnetic dipole moment, moving coilgalvanometer-its current sensitivity and conversion to ammeter and voltmeter.

Chapter–5: Magnetism and Matter

Bar magnet, bar magnet as an equivalent solenoid (qualitative treatment only) magnetic field intensity due to amagnetic dipole (bar magnet) along its axis and perpendicular to its axis (qualitative treatment only),torque on a magnetic dipole (bar magnet) in a uniform magnetic field (qualitative treatment only), magnetic field lines.

Magnetic properties of materials- Para-, dia- and ferro- magnetic substanceswith examples,Magnetisation of materials, effect of temperature on magnetic properties.

Unit IV: Electromagnetic Induction and Alternating Currents
Chapter–6: Electromagnetic Induction

Electromagnetic induction; Faraday's laws, induced EMF and current; Lenz'sLaw, Self and mutual induction.

Chapter–7: Alternating Current

Alternating currents, peak and RMS value of alternating current/voltage;reactance and impedance; LCRseries circuit (phasors only), resonance, power in AC circuits, power factor, wattless current.
AC generator and transformer.

Unit V: Electromagnetic waves
Chapter–8: Electromagnetic Waves

Basic idea of displacement current, Electromagnetic waves, theircharacteristics, their transverse nature (qualitative ideas only).

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

Unit VI: Optics
Chapter–9: Ray Optics and Optical Instruments

Ray Optics: Reflection of light, spherical mirrors, mirror formula, refraction oflight, total internal reflection and optical fibers, refraction atspherical surfaces, lenses, thin lens formula, lensmaker's formula,magnification, power of a lens, combination of thin lenses in contact,refraction of light through a prism.

Optical instruments: Microscopes and astronomical telescopes (reflecting andrefracting) and their magnifying powers.

Chapter–10: Wave Optics

Wave optics: Wave front and Huygens's principle, reflection and refraction ofplane wave at a plane surface using wave fronts. Proof of laws of reflectionand refraction using Huygens's principle. Interference, Young's double slitexperiment and expression for fringe width (No derivation, final expression only), coherent sources and sustainedinterference of light, diffraction due to a single slit, width of central maximum (qualitative treatment only). Polarisation, Plane polarized light, Brewster's law.

Unit VII: Dual Nature of Radiation and Matter
Chapter–11: Dual Nature of Radiation and Matter

Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations;Einstein's photoelectric equation-particle nature of light.
Experimental study of photoelectric effect.
Matter waves-wave nature of particles, de-Broglie relation.

Unit VIII: Atoms and Nuclei
Chapter–12: Atoms

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model of hydrogen atom, Expression for radius of nth possible orbit, velocity and energy of electron in this orbit, hydrogen line spectra (qualitative treatment only).

Chapter–13: Nuclei

Composition and size of nucleus, nuclear force.

Mass-energy relation, mass defect; binding energy per nucleon and itsvariation with mass number; nuclear fission, nuclear fusion.

Unit IX: Electronic Devices

Chapter–14: Semiconductor Electronics: Materials, Devices and Simple Circuits

Energy bands in conductors, semiconductors and insulators (qualitative ideasonly).

Intrinsic and extrinsic semiconductors- p- and n-type, p-n junction.

Semiconductor diode - I-V characteristics in forward and reverse bias, application of junction diode as a rectifier.

SYLLABUS FOR HALF-YEARLY EXAM
PHYSICS (THEORY)

Time: 3 hrs.   Maximum Marks: 70

UNIT	TOPICS	MARKS
Unit–I	**Electrostatics**	32
	Chapter–1: Electric Charges and Fields	
	Chapter–2: Electrostatic Potential andCapacitance	
Unit-II	**Current Electricity**	
	Chapter–3: Current Electricity	
Unit-III	**Magnetic Effects of Current and Magnetism**	32
	Chapter–4: Moving Charges and Magnetism	
	Chapter–5: Magnetism and Matter	
Unit-IV	**Electromagnetic Induction and Alternating Currents**	
	Chapter–6: Electromagnetic Induction	
	Chapter–7: Alternating Current	
Unit–V	**Electromagnetic Waves**	06
	Chapter–8: Electromagnetic Waves	
Total		**70**

Half-Yearly Syllabus of Class XII-2023-24
Subject: Physics
Course Structure
Blue print of Marks Distribution

Name of Units	Name of Chapters	VSA 1 Marks	SA 2 Marks	LA-01 3 Marks	LA-02 5 Marks	Total Marks
1 Electrostatics	Chapter-1 Electric Charges and Fields Chapter-2 Electrostatics Potential and Capacitance	1X4=4	2X3=6	3X2=6	-	16
2 Current Electricity	Chapter-3 Current Electricity	1X4=4	2X2=4	3X1=3	5X1=5	16
3 Magnetic Effect of Current And Magnetism	Chapter-4 Moving Charges and Magnetism Chapter-5 Magnetism And Matter	1X3=3	2X1=2	3X2=6	5X1=5	16
4 Electro-Magnetics Induction and Alternating Current	Chapter-6 Electro-Magnetic Induction Chapter-7 Alternating Current	1X5=5	-	3X2=6	5X1=5	16
5 Electro Magnetic Waves	Chapter-8 Electro Magnetic Waves	1X4=4	2X1=2	-	-	6
Total Marks		**1X20=20**	**2X7=14**	**3X7=21**	**5X3=15**	**70**

Class:- XII
Subject: Physics
Pre-Board and Board Final 2023-2024
BLUE-PRINT OF QUESTION PAPER

Unit	Chapter	VSA (1 Mark)		SA (2 Marks)	LA-I (3 Marks)	LA-II (5 Marks)	Total
		MCQ	Objective type				
Unit-I	**Electrostatics**						
	Ch-1: Electric Charges and Fields	1(1x1=1)	-	1(2x1=2)	-	1(5x1=5)	16
	Ch-2: Electrostatic Potential and Capacitance	1(1x1=1)					
Unit-II	**Current Electricity**						
	Ch-3: Current Electricity	1(1x1=1)	1(1x1=1)	1(2x1=2)	1(3x1=3)	_	
Unit-III	**Magnetic Effects of Current And Magnetism**						
	Ch-4: Moving Charges and Magnetism	-	1(1x1=1)	-	1(3x1=3)	1(5x1=5)	17
	Ch-5: Magnetism and Matter	1(1x1=1)		1(2x1=2)			
Unit-IV	**Electromagnetic Induction and Alternating Currents**						
	Ch-6: Electromagnetic induction	-	1(1x1=1)	-			
	Ch-7: Alternating Currents	1(1x1=1)	-	-	1(3x1=3)		
Unit-V	**Electromagnetic Waves**						18
	Electromagnetic Waves	-	-	-	1(3x1=3)	-	
Unit-VI	**Optics**						
	Ch-9: Ray Optics and Optical Instruments	1(1x1=1)	2(1x2=2)	1(2x1=2)	-	1(5x1=5)	
	Ch-10: Wave Optics	1(1x1=1)	1(1x1=1)		1(3x1=3)		

Unit	Chapter						
Unit-VII	**Dual nature of Radiationand Matter**						12
	Ch-11: Dual nature of Radiation and Matter	1(1x1=1)	1(1x1=1)	1(2x1=2)	-	-	
Unit-VIII	**Atoms and Nuclei**						
	Ch-12: Atoms	1(1x1=1)	1(1x1=1)		1(3x1=3)	-	
	Ch-13: Nuclei	-	1(1x1=1)	1(2x1=2)		-	
Unit-IX	**Electronic Devices**						7
	Ch-14: Semiconductor Electronics: Materials, Devices and Simple Circuits.	1(1x1=1)	1(1x1=1)	1(2x1=2)	1(3x1=3)	-	

Note:- The above template is only a sample. Suitable internal variation may be made for generating similar templates keeping the overall weightage to different form of questions and typology of question same.

PRACTICALS

The record, to be submitted by the students, at the time of their annual examination, has to include:

• Record of at least 6 Experiments [with 3 from each section], to be performed by the students.

EVALUATION SCHEME

Time 3 hours   Maximum Marks: 30

Topic	Marks
Two experiments one from each section	10+10
Practical record (experiment and activities)	3
Attendance	5
Viva on experiments	2
TOTAL	**30**

SECTION–A

Experiments

1. To determine resistivity of a given wire by plotting a graph for potential difference versus current.
2. To find resistance of a given wire / standard resistor using Meter Bridge.
3. To verify the laws of combination (series) of resistances using a Meter Bridge.

OR

To verify the laws of combination (parallel) of resistances using a Meter Bridge.

4. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.
5. To convert the given galvanometer (of known resistance and figure of merit) into a voltmeter of desired range and to verify the same.

OR

To convert the given galvanometer (of known resistance and figure of merit) into an ammeter of desired range and to verify the same.

6. To find the frequency of 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 $\frac{1}{u}$ and $\frac{1}{v}$.
4. To determine angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation.
5. To determine refractive index of a glass slab using a travelling microscope.
6. To find the refractive index of a liquid using convex lens and plane mirror.
7. To draw the I-V characteristic curve for a p-n junction diode in forward and reverse bias.

Prescribed Books:

1. Physics, Class XI, Part -I and II, Published by NCERT/SCERT.
2. Physics, Class XII, Part -I and II, Published by NCERT/SCERT.
3. Laboratory Manual of Physics for class XII Published by NCERT.
4. The list of other related books and manuals brought out by NCERT (consider multimedia also).

   Note: The content indicated in NCERT textbooks as excluded for the year 2023-2024 is not to be tested by schools and will not be assessed in the Board examinations 2023-2024.