



SYLLABUS - 2024- 2025

CLASS - XII

SUBJECT - PHYSICS

Total Marks - 70

Practical - 30

COURSE STRUCTURE

Time: 3 hrs.

Maximum Marks: 70

UNIT	TOPICS	MARKS
Unit-I	Electrostatics	16
	Chapter-1: Electric Charges and Fields	
	Chapter-2: Electrostatic Potential and Capacitance	
Unit-II	Current Electricity	16
	Chapter-3: Current Electricity	
Unit-III	Magnetic Effects of Current and Magnetism	17
	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	18
	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	12
	Chapter-11: Dual Nature of Radiation and Matter	
Unit-VIII	Atoms and Nuclei	12
	Chapter-12: Atoms	
	Chapter-13: Nuclei	
Unit-IX	Electronic Devices	07
	Chapter-14: Semiconductor Electronics: Materials, Devices and Simple Circuits	
Total Marks		70



**CLASS- XII
SUB- PHYSICS**

COURSE STRUCTURE

UNIT I: ELECTROSTATICS

Chapter-1: Electric Charges and Fields

Electric Charges, Conservation of charge, 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 uniform electric field.

Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly 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 potential energy of a system of two-point charges and of electric dipole 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 (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, 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 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 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 uniform magnetic field; Current loop as a magnetic dipole and its magnetic dipole moment, moving coil galvanometer-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 a magnetic 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 substances with 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's Law, Self and mutual induction.

Chapter-7: Alternating Current

Alternating currents, peak and rms value of alternating current/ voltage; reactance and impedance; LCR series 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, their characteristics, 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 of light, total internal reflection and optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens maker'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 and refracting) and their magnifying powers.

Chapter-10: Wave Optics

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

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 n^{th} possible orbit, velocity and energy of electron in n^{th} 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 its variation 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 ideas only).

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.

T B S E



CLASS- XII
SUB- PHYSICS

PRE-BOARD/ BOARD FINAL EXAMINATION: 2024-2025
BLUE-PRINT OF DISTRIBUTION OF MARKS

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	1x1=1	-	2x1=2	-	5x1=5 With Internal Choice	16	
Ch-2: Electrostatic Potential and capacitance	1x1=1							
Unit-II	Current Electricity							
	Ch-3: Current Electricity	1x1=1	1x1=1	2x1=2	3x1=3	-		
Unit-III	Magnetic Effects of Current and Magnetism							
	Ch-4: Moving Charges and Magnetism	-	1x1=1	-	3x1=3 With Internal choice from Ch-4 and Ch-6	5x1=5 With Internal Choice	17	
	Ch-5: Magnetism and Matter	1x1=1	-	2x1=2				
Unit-IV	Electromagnetic Induction and Alternating Currents							
	Ch-6: Electromagnetic Induction	-	1x1=1	-	-	-		
	Ch-7: Alternating Currents	1x1=1	-	-	3x1=3			
Unit-V	Electromagnetic Waves							
	Electromagnetic Waves	-	-	-	3x1=3	-		
Unit-VI	Optics							
	Ch-9: Ray Optics and Optical Instruments	1x1=1	1x2=2	2x1=2 With Internal Choice	-	5x1=5 With Internal Choice	18	
	Ch-10: Wave Optics	1x1=1	1x1=1		3x1=3			
Unit VII	Dual nature of Radiation and Matter							
	Ch-11: Dual nature of Radiation and Matter	1x1=1	1x1=1	2x1=2 With internal choice	-	-	12	
Unit-VIII	Atoms and Nuclei							
	Ch-12: Atoms	1x1=1	1x1=1	2x1=2	3x1=3	-		
Ch-13: Nuclei	-	1x1=1	-					



Electronic Device							
Unit-IX	Ch-14: Semiconductor, Electronics Materials, Devices and simple circuits	1x1=1	1x1=1	2x1=2	3x1=3	-	7
	Total Marks	1x10=10	1x10=10	2x7=14	3x7=21	5x3=15	70

Note:-

1. 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.
2. 02 (Two) nos. 'Assertion reasoning' type objective type questions of weightage 1 Mark may be set.
3. 01 (One) no. 'Comprehension' type question of weightage 3 Marks may be set.



CLASS- XII
SUB- PHYSICS

HALF-YEARLY EXAMINATION: 2024-2025

BLUE-PRINT OF DISTRIBUTION OF MARKS

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	1x1=1	1x1=1	2x1=2	3x1=3	-	16
	Ch-2: Electrostatic Potential and capacitance	1x1=1	1x1=1	2x2=4	3x1=3		
Unit- II	Current Electricity						
	Ch-3: Current Electricity	1x2=2	1x2=2	2x2=4	3x1=3	5x1=5	16
Unit- III	Magnetic Effects of Current and Magnetism						
	Ch-4: Moving Charges and Magnetism	-	1x1=1	2x1=2	3x1=3	5x1=5	16
	Ch-5: Magnetism and Matter	1x2=2	-	-	3x1=3		
Unit- IV	Electromagnetic Induction and Alternating Currents						
	Ch-6: Electromagnetic Induction	-	1x2=2	-	3x1=3	5x1=5	16
	Ch-7: Alternating Currents	1x2=2	1x1=1	-	3x1=3		
Unit-V	Electromagnetic Waves						
	Electromagnetic Waves	1x2=2	1x2=2	2x1=2	-	-	06
Total Marks		1x10=10	1x10=10	2x7=14	3x7=21	5x3=15	70

Note:-

1. 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.
2. 02 (Two) nos. 'Assertion reasoning' type objective type questions of weightage 1 Mark may be set.
3. 01 (One) no. 'Comprehension' type question of weightage 3 Marks may be set.



CLASS- XII
SUB- PHYSICS

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).