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FOR HARYANA CLASS 12 PREPARATION

HBSE Class 12 Syllabus 2027 Physics

EXAM	YEAR	TYPE	SUBJECT
Haryana Class 12	2027	Syllabus	Physics

BOARD OF SCHOOL EDUCATION HARYANA

Syllabus and Chapter wise division of Marks (2026-27)

Class: XII **Subject: Physics** **Code: 850**

General Instructions:

1. There will be an Annual Examination based on the entire syllabus.
2. The annual examination (Theory) will be of 70 Marks whereas Practical examination will be of 30 marks (15 marks each for external and internal examination). Therefore, Total annual evaluation (70+30) will be of 100 marks.
3. For Practical examination the criteria is as follows:

   Total Time: 3 Hours

PRACTICALS

Total Time: 3 Hours **Total marks: 30**

Evaluation Scheme	**Marks**
Marks allocated for Internal Assessment	**15**
1. Student Assessment Test Weightage of marks (04 marks of SAT, 02 marks of half yearly test, 02 marks for preboard, 02 marks for attendance and classroom participation)	10
2. Practical file/ Record	03
3. Project Record	02
Marks allocated for External Examination	**15**
Experiments (two)	09 (one from each section)
Activity (One from Syllabus)	03
Viva Voce	03
Total marks	**30**

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Course Structure (2026-27)

Class: XII **Subject: Physics** **Code: 850**

Sr. No.	Unit	Chapter	Marks
1	Electrostatic	Electric Charges and Fields	8
		Electrostatic Potential and Capacitance	
2	Current Electricity	Current Electricity	8
3	Magnetic Effects of Current and Magnetism	Moving Charges and Magnetism	9
		Magnetism and Matter	
4	Electromagnetic Induction and Alternating Currents	Electromagnetic Induction	8
		Alternating Current	
5	Electromagnetic Waves	Electromagnetic Waves	3
6	Optics	Ray Optics and Optical Instruments	14
		Wave Optics	
7	Dual Nature of Radiation and Matter	Dual Nature of Radiation and Matter	5
8	Atoms and Nuclei	Atoms	8
		Nuclei	
9	Electronic Devices	Semiconductor Electronics: Materials, Devices and Simple Circuits	7
Total			70
Practical Examination			30
Grand Total			**100**

Unit-I: Electrostatics

Chapter 1: Electric Charges and Fields

Electric charge, Basic Properties of Electric charge: Additivity of charges, conservation of charge, Quantisation of charges, Coulomb's law, force between multiple charges.

Electric field, electric field due to a system of charges, physical significance of electric field, electric field lines, electric dipole, The field of an electric dipole (for points on the axis and on equatorial plane) Dipole in a uniform external field. Continuous charge distribution.

Electric flux, Gauss's law, Applications of Gauss's law : Field due to an infinitely long straight uniformly charged wire, Field due to uniformly charged infinite plane sheet, Field due to a uniformly charged thin spherical shell. (Field inside and outside)

Chapter 2: Electrostatic Potential and Capacitance

Electrostatic Potential, Potential due to a point charge, Potential due to an electric dipole, Potential due to a system of charges, Equipotential surfaces, Relation between field and potential. Potential energy of a system of charges. Potential energy of a dipole in an external field.

Electrostatics of Conductors, Dielectrics and Polarisation, capacitors and capacitance, The parallel plate capacitor, Effect of Dielectric on capacitance, combination of capacitors (series and parallel), Energy stored in a capacitor (formula only), energy density.

Unit II: Current Electricity

Chapter 3: Current Electricity

Electric current, flow of electric charges in a metallic conductor, ohm's law, drift velocity, current density, mobility and their relation with electric current, Limitations of ohm's law, Resistivity of various materials, Temperature dependence of resistivity, Electrical energy, Power, cells: EMF, Internal Resistance, cells in series and in Parallel, Kirchhoff's rules, Principle of Wheatstone bridge.

Unit III: Magnetic Effects of Current and Magnetism

Chapter 4: Moving Charges and Magnetism

Concept of magnetic Field, Lorentz force, Magnetic force on a current carrying conductor, motion of charge in a magnetic field, Biot Savart Law, Magnetic field at the center and on the axis of a circular current loop, Ampere's circuital law and its application to infinitely long straight wire and Solenoid, force between two parallel current carrying conductors – definition of ampere, Torque on a rectangular current loop in a uniform magnetic field, circular current loop as a magnetic dipole, Moving coil galvanometer: its 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 lines magnetic field intensity to a magnetic dipole along its axis and perpendicular to its axis (qualitative treatment) , dipole in uniform magnetic field, Magnetisation and Magnetic Intensity, Magnetic Properties of Materials: Diamagnetism, Paramagnetism, Ferromagnetism.

Unit IV: Electromagnetic Induction and Alternating Currents

Chapter 6: Electromagnetic Induction

The Experiments of Faraday and Henry, Magnetic flux, Faraday's law of Induction, Lenz's law and Conservation of Energy, Motional Electromotive force, Inductance, self inductance of the coil, Mutual Inductance for long co-axial solenoids, Energy stored in inductor, AC generator.

Chapter 7: Alternating Current

Peak and RMS value of alternating current (No derivation), AC voltage applied to a Resistor, Representation of AC current and voltage by Rotating vectors – Phasors, AC voltage applied to an Inductor, AC voltage applied to a capacitor, AC voltage applied to a series LCR circuit, Resonance, Power in AC circuit: Power factor, Transformers.

Unit V: Electromagnetic Waves

Chapter 8: Electromagnetic Waves

Basic idea of displacement current, Electromagnetic waves: Sources and nature of electromagnetic waves, Electromagnetic spectrum: Radio waves, Microwaves, Infrared waves, Visible rays, Ultraviolet rays, X-rays, Gamma rays (elementary facts about their uses).

Unit VI: Optics

Chapter 9: Ray Optics and Optical Instruments

Reflection of light by spherical Mirror, Mirror formula, Refraction of light, Total Internal Reflection, Applications of TIR, Refraction at Spherical surfaces, Refraction by a lens, lens maker's formula. Power of a lens, combination of thin lenses in contact. Refraction through a prism.

Optical Instruments: Microscope (Simple and Compound), Refracting type Telescope and reflecting type (Cassegrainian)

Chapter 10: Wave Optics

Wave front, Huygen's Principle, Reflection and Refraction of plane wave using Huygen's Principle, Coherent sources, Interference of light waves, Young's Double slit experiment, condition for constructive and destructive interference, fringe width (No derivation). Diffraction due to a single slit

Unit VII: Dual nature of Radiation and Matter

Chapter 11: Dual Nature of Radiation and Matter

Electron Emission, Photoelectric effect: Experimental study of Photoelectric effect, Photoelectric effect and wave theory of light, Einstein's Photoelectric equation, Particle Nature of light: photon, wave nature of matter, de-Broglie formula.

Unit VIII: Atoms and Nuclei

Chapter 12: Atoms

Alpha-particle scattering and Rutherford's Nuclear model of atom, impact parameter, distance of closest approach, Bohr model of hydrogen atom, Expression for radius of nth possible orbit, velocity

and energy of electron in nth orbit, energy level diagram of hydrogen atom, The line spectra of the Hydrogen atom, De Broglie explanation of Bohr's second postulate of quantization.

Chapter 13: Nuclei

Composition and size of nucleus, Mass-Energy relation, mass defect, binding energy per nucleon and its variation with mass number, nuclear force, Nuclear energy: nuclear fission and fusion,

Unit IX: Electronic Devices

Chapter 14: Semiconductors Electronics: Materials, Devices and Simple Circuits

Classification of Metals, insulators and semiconductor on the basis of energy bands (qualitative treatment), Intrinsic semiconductor, Extrinsic semiconductor: P and n type, P-n junction formation, Semiconductor diode: p-n junction diode under forward bias, p-n junction diode under reverse bias, semiconductor diode I-V characteristics in forward and reverse bias, junction diode as Rectifier: Half wave and full wave rectifier.

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PRACTICALS:

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

* Record of at least 8 experiments [with 4 from each section], to be performed by the students.

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

* Report on the project carried out by the students.

SECTION-A

1. To determine resistivity of two/three given wires 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) / 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/ammeter of desired range and to verify the same.
6. To find the frequency of AC mains with a sonometer.

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 multi-meter.
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

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 angle of incidence and angle of deviation.
6. To determine refractive index of a glass slab using a travelling microscope.
7. To find the refractive index of a liquid using (*i*) convex lens, (*ii*) concave mirror and plane mirror.
8. To draw the I-V characteristic curve for a p-n junction diode in forward and reverse bias.

Activities

1. To identify a diode, an LED, a resistor and a capacitor from a mixed collection of such items.
2. Use of multimeter to see the unidirectional flow of current in case of a diode and an LED and check whether a given electronic component (e.g., diode) is in working order.
3. To study the 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 diffraction of light due to a thin slit.
6. To study the nature and size of the image formed by a (*i*) convex lens, or (*ii*) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror).
7. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.

Suggested Investigatory Projects

1. To study various factors on which the internal resistance/EMF of a cell depends.

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2. To study the variations in current flowing in a circuit containing an LDR because of a variation in
   (*a*) the power of the incandescent lamp, used to 'illuminate' the LDR (keeping all the lamps at a fixed distance).
   (*b*) the distance of a incandescent lamp (of fixed power) used to "illuminate' the LDR.
3. To find the refractive indices of (*a*) water (*b*) oil (transparent) using a plane mirror, and equiconvex lens (made from a glass of known refractive index) and an adjustable object needle.
4. To investigate the relation between the ratio of (*i*) output and input voltage and (*ii*) number of turns in the secondary coil and primary coil of a self-designed transformer.
5. To investigate the dependence of the angle of deviation on the angle of incidence using a hollow prism filled one by one, with different transparent fluids.
6. To estimate the charge induced on each one of the two identical Styrofoam (or pith) balls suspended in a vertical plane by making use of Coulomb's law.
7. To study the factor on which the self-inductance of a coil depends by observing the effect of this coil, when put in series with a resistor/(bulb) in a circuit fed up with an A.C. source of adjustable frequency.

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Month wise Syllabus Teaching Plan (2026-27)

Class: XII **Subject: Physics** **Code: 850**

Month	Subject-content	Teaching Periods	Revision Periods	Practical Periods
April	Chapter 1: Electric Charges and Fields Chapter 2: Electrostatic Potential and Capacitance <u>Practical:</u> To determine resistivity of two/three given wires by plotting a graph for potential difference versus current.	10 12	2 02	 8
May	Chapter 3: Current Electricity Chapter 4: Moving Charges and Magnetism <u>Practical:</u> To find resistance of a given wire / standard resistor using meter bridge. <u>Activities:</u> To measure the resistance and impedance of an inductor with or without iron core.	11 12	02 02	 12
June	**Summer Vacation (Project work)**			

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July	Chapter 5: Magnetism and Matter Chapter 6: Electromagnetic Induction <u>Practical:</u> To verify the laws of combination (series) / parallel of resistances using a meter bridge. <u>Activities:</u> To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source. To assemble the components of a given electrical circuit.	09 12	02 02	12
August	Chapter 7: Alternating Current Chapter 8: Electromagnetic Waves <u>Practical:</u> To determine resistance of a galvanometer by half-deflection method and to find its figure of merit. To convert the given galvanometer (of known resistance and figure of merit) into a voltmeter/ammeter of desired range and to verify the same. <u>Activities:</u> To study the variation in potential drop with length of a wire for a steady current.	10 04	04 01	12

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	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.			
September	Revision for Half-Yearly Exam Practical: To find the frequency of AC mains with a sonometer. Activities: To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multi-meter.		10	10
October	Chapter 9: Ray Optics and Optical Instruments Chapter 10: Wave optics Practical: 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*. Activities:	14 10	03 02	10

	To study the nature and size of the image formed by a (*i*) convex lens, or (*ii*) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror). To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.			
November	Chapter 11: Dual Nature of Radiation and Matter	08	02	12
	Chapter 12: Atoms	10	04	
	<u>Practical:</u> To find the focal length of a concave lens, using a convex lens. To determine angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation. To determine refractive index of a glass slab using a travelling microscope. <u>Activities:</u> To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.			

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	To observe diffraction of light due to a thin slit.			
December	Chapter 13: Nuclei Chapter 14: Semiconductor Electronics: Materials, Devices and Simple Circuits <u>Practical:</u> To find the refractive index of a liquid using (*i*) convex lens, (*ii*) concave mirror and plane mirror. To draw the I-V characteristic curve for a p-n junction diode in forward and reverse bias. <u>Activities:</u> To identify a diode, an LED, a resistor and a capacitor from a mixed collection of such items. Use of multimeter to see the unidirectional flow of current in case of a diode and an LED and check whether a given electronic component (e.g., diode) is in working order. To study effect of intensity of light (by varying distance of the source) on an LDR.	08 12	02 04	12
January	**Revision and practice of previous year papers**		10	10

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February	**Revision and practice of previous year papers**		08	08
March	**Annual Examination**			

Note:

1. Subject teachers are advised to direct the students to prepare notebook of the Terminology/Definitional Words used in the chapters for enhancement of vocabulary or clarity of the concept.

2. The NCERT textbooks present information in boxes across the book. These help students to get conceptual clarity. However, the information in these boxes would not be assessed in the year-end examination.

Prescribed Books:

1. Physics, Class XII, Part -I and II, Published by BSEH © NCERT.
2. Laboratory Manual of Physics for class XII Published by NCERT.

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Question Paper Design (2026-27)

Class: XII **Subject: Physics**

Code: 850 **Time: 3 hours**

Competencies	Marks	Percentage
Knowledge	28	40%
Understanding	21	30%
Application	14	20%
Skill	7	10%
Total	**70**	**100%**

Type of Question	Marks	Number	Description	Total Marks
Objective Questions	1	18	09 Multiple Choice Questions 03 Fill in the blanks 03 One Word Answer Based 03 Assertion-Reason Questions	18
Very Short Answer Type Question	2	7	Internal choice will be given in any 3 questions	14
Short Answer Type Question	3	5	Internal choice will be given in any 2 questions	15
Case Study	4	2	Internal choice will be given only in one part of both questions	8

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Long Answer Type Question	5	3	Internal options will be given in all the questions and may be given in the parts	15
Total		**35**		**70**

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