Haryana Board

Syllabus

2023-24

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BOARD OF SCHOOL EDUCATION HARYANA

Syllabus and Chapter wise division of Marks (2023-24)

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

General Instructions:

1. There will be an annual examination based on the entire syllabus.
2. The annual theory examination will be of **70 marks**.
3. Practical Examination will be of **30 marks** (15 marks weightage shall be for Internal Assessment (INA) and 15 marks for practical examination.)

4. Evaluation scheme for Internal Assessment: (15 marks)

Student Assessment (SAT) exams	4 marks
Half yearly exam	2 marks
Pre-Board Exam	2 marks
Attendance and classroom participation	2 marks
Project work	2 marks
Practical record	3 marks
Total	**15 marks**

5. For Practical Examination: (15 marks)

Evaluation Scheme for Practical Examination	Marks
Two experiments (one from each section)	09
One Activity	03
Viva-voce	03
Total	**15 marks**

Practical total marks (15+15) = 30 marks
Theory marks = 70 marks
Total marks = 100 marks

Course Structure (2023-24)

Class-XII Subject: Physics Code: 850

Sr. No.	Unit	Chapter	Total
I	Electrostatic	Electric Charges and Fields	8
		Electrostatic Potential and Capacitance	
II	Current Electricity	Current Electricity	8
III	Magnetic Effects of Current and Magnetism	Moving Charges and Magnetism	9
		Magnetism and Matter	
IV	Electromagnetic Induction and Alternating Currents	Electromagnetic Induction	8
		Alternating Current	
V	Electromagnetic Waves	Electromagnetic Waves	3
VI	Optics	Ray Optics and Optical Instruments	14
		Wave Optics	
VII	Dual Nature of Radiation and Matter	Dual Nature of Radiation andMatter	5
VIII	Atoms and Nuclei	Atoms	8
		Nuclei	
IX	Electronic Devices	Semiconductor Electronics: Materials, Devices and Simple Circuits	7
Total			70
Practical			30
Grand Total			**100**

Unit I: Electrostatics

Chapter 1: Electric Charges and Fields

Introduction, Electric Charge, Conductors and Insulators, Basic Properties of Electric Charge: Additivity of Charges, Charge is Conserved, Quantization of Charge**, Coulomb's Law, Forces Between Multiple Charges, Electric Field:** Electric Field Due to a System of Charges, Physical Significance of Electric Field**, Electric Field Lines, Electric Flux, Electric Dipole:** The Field of an Electric Dipole, Physical Significance of Dipoles, **Dipole in a Uniform External Field, Continuous Charge Distribution, Gauss's Law, Application of Gauss's Law:** Field Due to an Infinitely Long Straight Uniformly Charged Wire, Field Due to a Uniformly Charged Infinite Plane Sheet, Field Due to a Uniformly Charged Thin Spherical Shell.

Chapter 2: Electrostatic Potential and Capacitance

Introduction, 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 in an External Field:** Potential Energy of a Single Charge, Potential Energy of a System of Two Charges in an External Field, Potential Energy of a Dipole in an External Field, **Electrostatics of Conductors, Dielectric and Polarization, Capacitors and Capacitance, The Parallel Plate Capacitor, Effect of Dielectric on Capacitance, Combination of Capacitors:** Capacitors in Series, Capacitors in Parallel**, Energy Stored in a Capacitor.**

Unit II: Current Electricity

Chapter 3: Current Electricity

Introduction, Electric Current, Electric Currents in Conductors, Ohm's Law, Drift of Electrons and The Origin of Resistivity: Mobility, **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, Wheatstone Bridge.**

Unit III: Magnetic Effects of Current and Magnetism

Chapter 4: Moving Charges and Magnetism

Introduction, Magnetic Force: Sources and Fields, Magnetic Field,

Lorentz Force, Magnetic Force on a Current Carrying Conductor, **Motion in a Magnetic Field Magnetic Field Due to a Current Element, Biot Savart Law, Magnetic Field on The Axis of a Circular Current Loop, Ampere's Circuital Law, Das Solenoid, Force Between Two Parallel Currents, The Ampere, Torque on Current Loop, Magnetic Dipole:** Torque on a Rectangular Current Loop in a Uniform Magnetic Field, Circular Current Loop as a Magnetic Dipole**, The Moving Coil Galvanometer.**

Chapter 5: Magnetism and Matter

Introduction, The Bar Magnet: The Magnetic Field Lines, Bar Magnet as an Equivalent Solenoid, The Dipole in a Uniform Magnetic Field, The Electrostatic Analog, **Magnetism and Gauss's Law, Magnetization and Magnetic Intensity, Magnetic Properties of Materials:** Diamagnetism, Paramagnetism, Ferromagnetism.

Unit IV: Electromagnetic Induction and Alternating Currents

Chapter 6: Electromagnetic Induction

Introduction, The Experiments of Faraday and Henry, Magnetic Flux, Faraday's Law of Induction, Lenz's Law and Conservation of Energy Motional Electromotive Force, Inductance: Mutual Inductance, Self-Inductance, **AC Generator.**

Chapter 7: Alternating Current

Introduction, 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: Phasor-Diagram Solution, Resonance, **Power in AC Circuit: The Power Factor, Transformers.**

Unit V: Electromagnetic Waves

Chapter 8: Electromagnetic Waves

Introduction, Displacement Current, Electromagnetic Waves: Sources of Electromagnetic Waves, Nature of Electromagnetic Waves, **Electromagnetic Spectrum:** Radio Waves, Microwaves, Infrared Waves, Visible Rays, Ultraviolet Rays, X-Rays, Gamma Rays.

Unit VI: Optics

Chapter 9: ray optics and optical instruments

Introduction, Reflection of Light By Spherical Mirrors: Sign

Convention, Focal Length of Spherical Mirrors, Mirror Equation, **Refraction, Total Internal Reflection:** Total internal reflection in nature and its technological applications, **Refraction At Spherical Surfaces and By Lenses:** Refraction At a Spherical Surface, Refraction By a Lens, Power of a Lens, Combination of Thin Lenses in Contact**, Refraction Through a Prism, Optical Instruments:** The Microscope, Telescope.

Chapter 10: **Wave Optics**

Introduction, Huygens Principle, Refraction and Reflection of Plane Waves Using Huygens Principle: Refraction of a Plane Wave, Refraction At a Rarer Medium, Reflection of a Plane Wave By a Plane Surface, **Coherent and Incoherent Edition of Waves, Interference of Light Waves and Young's Experiment, Diffraction:** The Single Slit, Seeing The Single Slit Diffraction Pattern, **Polarization.**

Unit VII: Dual Nature of Radiation and Matter

Chapter 11: Dual Nature of Radiation and Matter

Introduction, electron emission, photoelectric effect: Hertz's Observations, Hallwachs' and Lenard's Observation, **Experimental Study of Photoelectric Effect:** Effect of Intensity of Light on Photocurrent Effect of Potential on Photoelectric Current, Effect of Frequency of Incident Radiation on Stopping Potential, **Einstein's Photo Electric Equation: Energy Quantum of Radiation, Particle Nature of Light: The Photon, Wave Nature of Matter.**

Unit VIII: Atom and Nuclei

Chapter 12: Atoms

Introduction, Alpha-Particle Scattering and Rutherford's Nuclear Model of Atom: Alpha-Particle Trajectory, Electron Orbits, **Atomic Spectra, Bohr Model of the Hydrogen Atom:** Energy Levels, **The Line Spectra of the Hydrogen Atom, De Broglie's Explanation of Bohr's Second Postulate of Quantisation.**

Chapter 13: Nuclei

Introduction, Atomic Masses and Composition of Nucleus, Size of the Nucleus, Mass-Energy and Nuclear Binding Energy: Mass-Energy, Nuclear Binding Energy, **Nuclear Force, Radioactivity, Nuclear Energy:** Fission, Nuclear Fusion - Energy Generation in Stars, Controlled Thermonuclear Fusion.

Unit IX: Electronic Devices

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

Introduction, Classification of Metals, Conductors and Semiconductors, Intrinsic Semiconductor, Extrinsic Semiconductor, p-n Junction: p-n Junction Formation, **Semiconductor Diode:** p-n Junction Diode under Forward Bias, p-n Junction Diode under Reverse Bias, **Application of Junction Diode as Rectifier.**

Practicals :

SECTION–A

1. to determine resistivity of wire by plotting a graph for potential difference versus current.
2. to find resistance of a given wire / standard resistor using metre 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 thesame.
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, afuse 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 findthe 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* orbetween *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 reversebias.

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 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 aglass 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) concavemirror, 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.
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 allthe lamps at a fixed distance).
   - **(b)** the distance of a incandescent lamp (of fixed power) used to 'illuminate' theLDR.
3. to find the refractive indices of (a) water (b) oil (transparent) using a plane mirror, anequiconvex 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 by an A.C.source of adjustable frequency.

Monthwise Syllabus Teaching Plan (2023-24)

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

Month	Subject- content	Teaching Periods	Revision Periods	Practical Work
April	Ch–1: Electric Charges and Fields Ch–2: Electrostatic Potential and Capacitance	**10** **12**	**02** **02**	**08**
May	Ch–3: Current Electricity Ch–4: Moving Charges and Magnetism	**11** **12**	**02** **02**	**12**
June	**Summer Vacation (Project Work)**			
July	Ch–5: Magnetism and Matter Ch–6: Electromagnetic Induction	**09** **12**	**02** **02**	**12**
August	Ch–7: Alternating Current Ch–8: Electromagnetic Waves	**10** **04**	**04** **01**	**12**
September	Revision Half Yearly Examination		**10**	
October	Ch–9: Ray Optics and Optical Instruments Ch–10: Wave optics	**14** **10**	**03** **03**	**10**

November	Ch–11: Dual Nature of Radiation and Matter Ch-12:Atoms	**08** **10**	**02** **04**	**12**
December	Ch-13 : Nuclei Ch–14: Semiconductor Electronics: Materials, Devices and Simple Circuits	**08** **12**	**02** **04**	**12**
January	**Revision**		**10**	**10**
February	**Revision**		**08**	**08**
March	**Annual Examination**			

Note:

- **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.**

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.

Question Paper Design (2023-24)

Class- 12th Subject: Physics Code: 850

Type of Question	Marks	Number of Question	Description	Total Marks
Objective Questions	1 mark each	18	14 Multiple Choice Questions, 4 Assertion-Reason Questions	18
Very Short Answer Type Question	2 marks each	7	Internal choice will be given in any 2 questions	14
Short Answer Type Question	3 marks each	5	Internal choice will be given in any 2 questions	15
Case Study	4 marks each	2	Internal choice will be given only in one part of both questions	8
Long Answer Type Question	5 marks each	3	Internal choice will be given in all the questions	15
Total		**35**		**70**