

# KENDRIYA VIDYALAYA SANGATHAN

## PATNA REGION

### SPLIT UP SYLLABUS OF PHYSICS FOR CLASS XI

#### PHYSICS (CODE 042)

Senior Secondary stage of school education is a stage of transition from general education to discipline-based focus on curriculum. The present updated syllabus keeps in view the rigour and depth of disciplinary approach as well as the comprehension level of learners. Due care has also been taken that the syllabus is comparable to the international standards. Salient features of the syllabus include:

Emphasis on basic conceptual understanding of the content.

Emphasis on use of SI units, symbols, nomenclature of physical quantities and formulations as per international standards.

Providing logical sequencing of units of the subject matter and proper placement of concepts with their linkage for better learning.

Reducing the curriculum load by eliminating overlapping of concepts/content within the discipline and other disciplines.

Promotion of process-skills, problem-solving abilities and applications of Physics concepts.

#### **Besides, the syllabus also attempts to**

strengthen the concepts developed at the secondary stage to provide firm foundation for further learning in the subject.

expose the learners to different processes used in Physics-related industrial and technological applications.

develop process-skills and experimental, observational, manipulative, decision making and investigatory skills in the learners.

promote problem solving abilities and creative thinking in learners.

develop conceptual competence in the learners and make them realize and appreciate the interface of Physics with other disciplines.

#### **PHYSICS (CODE 042)**

#### **COURSE STRUCTURE**

Class-XI(Theory) 2016-17

**One Paper**

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

Months	Name of Chapter	No. of Periods	Marks
July	Unit I Physical World and Measurement	10	} 23
July	Unit II Kinematics	24	
August	Unit III Laws of Motion	14	
August	Unit IV Work, Energy and Power	12	} 17
September	Unit V Motion of System of Particles and Rigid Body	18	
September	Unit VI Gravitation	12	} 20
October	Unit VII Properties of Bulk Matter & Revision for Half Yearly Exam.	24	
November	Unit VIII Thermodynamics	12	
December	Unit IX Behaviour of Perfect Gases and Kinetic Theory of gases	08	} 10
Jan & Feb	Unit X Oscillations and Waves & Revision for SEE.	26	
<b>Total</b>		<b>160</b>	<b>70</b>

**PHYSICS (Code No. 042)**  
**COURSE STRUCTURE**  
**Class XI (Theory)**

Time: 3 hrs.

Max Marks: 70

		No. of Periods	Marks
Unit-I	Physical World and Measurement	10	23
	Chapter-1: Physical World		
	Chapter-2: Units and Measurements		
Unit-II	Kinematics	24	
	Chapter-3: Motion in a Straight Line		
	Chapter-4: Motion in a Plane		
Unit-III	Laws of Motion	14	
	Chapter-5: Laws of Motion		

Unit-IV	Work, Energy and Power	12	17
	Chapter-6: Work, Energy and Power		
Unit-V	Motion of System of Particles and Rigid Body	18	
	Chapter-7: System of Particles and Rotational Motion		
Unit-VI	Gravitation	12	
	Chapter-8: Gravitation		
Unit-VII	Properties of Bulk Matter	24	20
	Chapter-9: Mechanical Properties of Solids		
	Chapter-10: Mechanical Properties of Fluids		
	Chapter-11: Thermal Properties of Matter		
Unit-VIII	Thermodynamics	12	
	Chapter-12: Thermodynamics		
Unit-IX	Behaviour of Perfect Gases and Kinetic Theory of Gases	08	
	Chapter-13: Kinetic Theory		
Unit-X	Oscillations and Waves	26	10
	Chapter-14: Oscillations		
	Chapter-15: Waves		
<b>Total</b>		<b>160</b>	<b>70</b>

## Exam Wise Split Up Syllabus

Class XI (Physics) 2016-17

Exam Name	From	To
1st Unit Test	Unit-I	Unit- II
2nd Unit Test	Unit-III	Unit-IV
Half Yearly	Unit-I	Unit-VI
3rd Unit Test	Unit- VII	Unit-VIII
Session Ending	Unit -I	Unit-X

## **Unit I: Physical World and Measurement**

**10 Periods**

Physics - scope and excitement; nature of physical laws; Physics, technology and society.

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures.

Dimensions of physical quantities, dimensional analysis and its applications.

## **Unit II: Kinematics**

**24 Periods**

Frame of reference, Motion in a straight line: Position-time graph, speed and velocity.

Elementary concepts of differentiation and integration for describing motion. Uniform and non-uniform motion, average speed and instantaneous velocity. Uniformly accelerated motion, velocity time and position-time graphs.

Relations for uniformly accelerated motion (graphical treatment).

Scalar and vector quantities; Position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity. Unit vector; Resolution of a vector in a plane - rectangular components. Scalar and Vector product of vectors.

Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

## **Unit III: Laws of Motion**

**14 Periods**

Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion.

Law of conservation of linear momentum and its applications.

Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on banked road).

## **Unit IV: Work, Energy and Power**

**12 Periods**

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.

Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-conservative forces: motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

## **Unit V: Motion of System of Particles and Rigid Body**

**18 Periods**

Centre of mass of a two-particle system, momentum conservation and centre of mass motion.

Centre of mass of a rigid body; centre of mass of a uniform rod.

Moment of a force, torque, angular momentum, laws of conservation of angular momentum and its applications.

Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions.

Moment of inertia, radius of gyration. Values of moments of inertia, for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.

## **Unit VI: Gravitation**

**12 Periods**

Keplar's laws of planetary motion. The universal law of gravitation.

Acceleration due to gravity and its variation with altitude and depth.

Gravitational potential energy and gravitational potential. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites.

## **Unit VII: Properties of Bulk Matter**

**24 Periods**

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity, Poisson's ratio; elastic energy.

Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure.

Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity. Bernoulli's theorem and its applications.

Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity;  $C_p$ ,  $C_v$  - calorimetry; change of state - latent heat capacity.

Heat transfer-conduction, convection and radiation, thermal conductivity, Qualitative ideas of Blackbody radiation, Wein's displacement Law, Stefan's law, Green house effect.

## **Unit VIII: Thermodynamics**

**12 Periods**

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics). Heat, work and internal energy. First law of thermodynamics. Isothermal and adiabatic processes.

Second law of thermodynamics: reversible and irreversible processes. Heat engine and refrigerator.

## **Unit IX: Behaviour of Perfect Gases and Kinetic Theory of Gases**

**08 Periods**

Equation of state of a perfect gas, work done in compressing a gas.

Kinetic theory of gases - assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

## **Unit X: Oscillations and Waves**

**26 Periods**

Periodic motion - time period, frequency, displacement as a function of time. Periodic functions.

Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring-restoring force and force constant; energy in S.H.M. Kinetic and potential energies; simple pendulum derivation of expression for its time period.

Free, forced and damped oscillations (qualitative ideas only), resonance.

Wave motion. Transverse and longitudinal waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.

## PRACTICALS

**Total Periods: 60**

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

Record of at least 15 Experiments [with a minimum of 8 from section A and 7 from section B], to be performed by the students.

Record of at least 5 Activities [with a minimum of 2 each from section A and section B], to be performed by the students.

Report of the project to be carried out by the students.

## EVALUATION SCHEME

Two experiments one from each section	8+8 Marks
Practical record (experiment and activities)	6 Marks
Investigatory Project	3 Marks
Viva on experiments, activities and project	5 Marks
<b>Total 30 Marks</b>	

## SECTION–A

### Experiments

*(Any 8 experiments out of the following to be performed by the Students)*

- To measure diameter of a small spherical/cylindrical body and to measure internal diameter and depth of a given beaker/calorimeter using Vernier Callipers and hence find its volume.
- To measure diameter of a given wire and thickness of a given sheet using screw gauge.
- To determine volume of an irregular lamina using screw gauge.
- To determine radius of curvature of a given spherical surface by a spherometer.
- To determine the mass of two different objects using a beam balance.
- To find the weight of a given body using parallelogram law of vectors.
- Using a simple pendulum, plot L-T and L-T<sup>2</sup> graphs. Hence find the effective length of second's pendulum using appropriate graph.
- To study variation of time period of a simple pendulum by changing its length and taking bobs of different masses independently and interpret the result.
- To study the relationship between force of limiting friction and normal reaction and to find the coefficient of friction between a block and a horizontal surface.
- To find the downward force, along an inclined plane, acting on a roller due to Gravitational pull of the earth and study its relationship with the angle of inclination ( $\theta$ ) by plotting graph between force and  $\sin \theta$ .

### Activities

- To make a paper scale of given least count, e.g., 0.2cm, 0.5 cm.
- To determine mass of a given body using a metre scale by principle of moments.

3. To plot a graph for a given set of data, with proper choice of scales and error bars.
4. To measure the force of limiting friction for rolling of a roller on a horizontal plane.
5. To study the variation in range of a Projectile with angle of projection.
6. To study the conservation of energy of a ball rolling down on an inclined plane (using a double inclined plane).
7. To study dissipation of energy of a simple pendulum by plotting a graph between square of amplitude and time.

## SECTION-B

### Experiments

*(Any 7 experiments out of the following to be performed by the students)*

1. To determine Young's modulus of elasticity of the material of a given wire.
2. To find the force constant of a helical spring by plotting a graph between load and extension.
3. To study the variation in volume with pressure for a sample of air at constant temperature by plotting graphs between P and V, and between P and  $1/v$ .
4. To determine the surface tension of water by capillary rise method.
5. To determine the coefficient of viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.
6. To study the relationship between the temperature of a hot body and time by plotting a cooling curve.
7. To determine specific heat capacity of a given (i) solid, (ii) liquid, by method of mixtures.
8. To study the relation between frequency and length of a given wire under constant tension using sonometer.

OR

To study the relation between the length of a given wire and tension for constant frequency using sonometer.

9. To find the speed of sound in air at room temperature using a resonance tube by two resonance positions.

### Activities

1. To observe change of state and plot a cooling curve for molten wax.
2. To observe and explain the effect of heating on a bi-metallic strip.
3. To note the change in level of liquid in a container on heating and interpret the observations.
4. To study the effect of detergent on surface tension of water by observing capillary rise.
5. To study the factors affecting the rate of loss of heat of a liquid.
6. To study the effect of load on depression of a suitably clamped metre scale loaded at (i) its end (ii) in the middle.
7. To observe the decrease in pressure with increase in velocity of a fluid.

### Prescribed Books:

1. Physics Part-I, Textbook for Class XI, Published by NCERT
2. Physics Part-II, Textbook for Class XI, Published by NCERT

**PHYSICS (Code No. 042)**  
**QUESTION PAPER DESIGN**  
**CLASS - XI**

Time 3 Hours

Max. Marks: 70

S. No.	Typology of Questions	Very Short Answer (VSA) (1 mark)	Short Answer-I (SA-I) (2 marks)	Short Answer -II (SA-II) (3 marks)	Value based question (4 marks)	Long Answer (LA) (5 marks)	Total Marks	% Weightage
1.	<b>Remembering-</b> (Knowledge based Simple recall questions, to know specific facts, terms, concepts, principles, or theories, identify, define, or recite, information)	2	1	1	–	–	7	10%
2	<b>Understanding-</b> (Comprehension -to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information)	–	2	4	–	1	21	30%
3	<b>Application (Use abstract - information in concrete situation, to apply knowledge to new situations, Use given content to interpret a situation, provide an example, or solve a problem)</b>	–	2	4	–	1	21	30%
4	<b>High Order Thinking Skills (Analysis &amp; Synthesis- Classify, compare, contrast, or differentiate between different pieces of</b>	2	–	1	–	1	10	14%

	information, Organize and/or integrate unique pieces of information from a variety of sources)							
5	Evaluation and Multi-Disciplinary- (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	1	–	2	1	–	11	16%
<b>TOTAL</b>		<b>5x1=5</b>	<b>5x2=10</b>	<b>12x3=36</b>	<b>1x4=4</b>	<b>3x5=15</b>	<b>70(26)</b>	<b>100%</b>

### QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Questions	Total Marks
VSA	1	5	05
SA-I	2	5	10
SA-II	3	12	36
VBQ	4	1	04
LA	5	3	15
<b>Total</b>		<b>26</b>	<b>70</b>

1. **Internal Choice:** *There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 5 marks weightage.*
2. *The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.*

**KENDRIYA VIDYALAYA SANGATHAN**  
**PATNA REGION**  
**SPLIT UP SYLLABUS OF PHYSICS FOR CLASS XII**

**CLASS XII (2016-17)**  
**(THEORY)**

**One Paper**

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

Months		No. of Periods	Marks
APRIL	Unit I Electrostatics	22	} 15
APRIL	Unit II Current Electricity	20	
May- June	Unit III Magnetic Effect of Current and Magnetism	22	} 16
July	Unit IV Electromagnetic Induction and Alternating Current	20	
July	Unit V Electromagnetic Waves	04	} 17
August	Unit VI Optics	25	
Sept	Unit VII Dual Nature of Matter	08	} 10
Sept	Unit VIII Atoms and Nuclei	14	
Oct	Unit IX Electronic Devices	15	} 12
Oct	Unit X Communication Systems	10	
	<b>Total</b>	<b>160</b>	<b>70</b>

**Class-XII 2016-17**  
**(THEORY)**

Time: 3 hrs.

Max Marks: 70

		No. of Periods	Marks
Unit-I	Electrostatics	22	15
	Chapter-1: Electric Charges and Fields		
	Chapter-2: Electrostatic Potential and Capacitance		
Unit-II	Current Electricity	20	15
	Chapter-3: Current Electricity		
Unit-III	Magnetic Effects of Current and Magnetism	22	16
	Chapter-4: Moving Charges and Magnetism		
	Chapter-5: Magnetism and Matter		
Unit-IV	Electromagnetic Induction and Alternating Currents	20	
	Chapter-6: Electromagnetic Induction		16
	Chapter-7: Alternating Current		
Unit-V	Electromagnetic Waves	04	17
	Chapter-8: Electromagnetic Waves		
Unit-VI	Optics	25	17
	Chapter-9: Ray Optics and Optical Instruments		
	Chapter-10: Wave Optics		
Unit-VII	Dual Nature of Radiation and Matter	08	10
	Chapter-11: Dual Nature of Radiation and Matter		
Unit-VIII	Atoms and Nuclei	14	10
	Chapter-12: Atoms		
	Chapter-13: Nuclei		
Unit-IX	Electronic Devices	15	12
	Chapter-14: Semiconductor Electronics: Materials, Devices and Simple Circuits		
Unit-X	Communication Systems	10	12
	Chapter-15: Communication Systems		
<b>Total</b>		<b>160</b>	<b>70</b>

**Unit I: Electrostatics****22 Periods**

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).

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.

**Unit II: Current Electricity****20 Periods**

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. Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; 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 bridge, metre bridge.

Potentiometer - principle and its applications to measure potential difference and for comparing EMF of two cells; measurement of internal resistance of a cell.

### **Unit III: Magnetic Effects of Current and Magnetism**

**22 Periods**

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, force on a moving charge in uniform magnetic and electric fields. Cyclotron.

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; 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. 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; bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements.

Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths. Permanent magnets.

### **Unit IV: Electromagnetic Induction and Alternating Currents**

**20 Periods**

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

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, wattless current.

AC generator and transformer.

### **Unit V: Electromagnetic waves**

**04 Periods**

Need for displacement current, Electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves.

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

### **Unit VI: Optics**

**25 Periods**

Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lensmaker'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.

Scattering of light - blue colour of sky and reddish appearance of the sun at sunrise and sunset.

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

**Wave optics**: Wave front and Huygen's principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygen's principle.

Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescope. Polarisation, plane polarised light, Brewster's law, uses of plane polarised light and Polaroids.

### **Unit VII: Dual Nature of Matter and Radiation**

**08 Periods**

Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light.

Matter waves-wave nature of particles, de Broglie relation. Davisson-Germer experiment (experimental details should be omitted; only conclusion should be explained).

### **Unit VIII: Atoms and Nuclei**

**14 Periods**

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.

Composition and size of nucleus, Radioactivity, alpha, beta and gamma particles/rays and their properties; radioactive decay law.

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

### **Unit IX: Electronic Devices**

**15 Periods**

Energy bands in solids (Qualitative ideas only) conductor, insulator and semiconductor; semiconductor diode - I-V characteristics in forward and reverse bias, diode as a rectifier; I-V characteristics of LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator.

Junction transistor, transistor action, characteristics of a transistor, transistor as an amplifier (common emitter configuration). Logic gates (OR, AND, NOT, NAND and NOR).

### **Unit X: Communication Systems**

**10 Periods**

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. Basic ideas about internet, mobile telephony and global positioning system (GPS)

### **PRACTICALS**

**(Total Periods 60)**

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

Record of at least 15 Experiments [with a minimum of 7 from section A and 8 from section B], to be performed by the students.

Record of at least 5 Activities [with a minimum of 2 each from section A and section B], to be demonstrated by the teachers.

The Report of the project, to be carried out by the students.

## Evaluation Scheme

Two experiments one from each section	8+8 Marks
Practical record [experiments and activities]	6 Marks
Investigatory Project	3 Marks
Viva on experiments, activities and project	5 Marks
<b>Total 30 marks</b>	

### SECTION–A

#### Experiments

*(Any 7 experiments out of the following to be performed by the students)*

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

*Activities (For the purpose of demonstration only)*

July	1. To measure the resistance and impedance of an inductor with or without iron core.
July	2. To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multimeter.
May	3. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.
May	4. To assemble the components of a given electrical circuit.
June	5. To study the variation in potential drop with length of a wire for a steady current.
May	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

#### Experiments

*(Any 8 experiments out of the following to be performed by the students)*

August	1. To find the value of $v$ for different values of $u$ in case of a concave mirror and to find the focal length.
August	2. To find the focal length of a convex mirror, using a convex lens.
August	3. To find the focal length of a convex lens by plotting graphs between $u$ and $v$ or between $1/u$ and $1/v$ .

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

### Activities (For the purpose of demonstration only)

October	1. To identify a diode, an LED, a transistor, an IC, a resistor and a capacitor from a mixed collection of such items.
October	2. Use of multimeter to (i) identify base of transistor, (ii) distinguish between npn and pnp type 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.
October	3. To study effect of intensity of light (by varying distance of the source) on an LDR.
August	4. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.
August	5. To observe polarization of light using two Polaroids.
August	6. To observe diffraction of light due to a thin slit.
August	7. To study the nature and size of the image formed by a (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).
August	8. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.

### Suggested Investigatory Projects

- To study various factors on which the internal resistance/EMF of a cell depends.
- To study the variations, in current flowing, in a circuit containing an LDR, because of a variation.
  - in the power of the incandescent lamp, used to 'illuminate' the LDR. (keeping all the lamps at a fixed distance).
  - in the distance of a incandescent lamp (of fixed power) used to 'illuminate' the LDR.
- To find the refractive indices of (a) water (b) oil (transparent) using a plane mirror, an equi convex lens, (made from a glass of known refractive index) and an adjustable object needle.
- To design an appropriate logic gate combination for a given truth table.
- 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.
- 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.
- 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.
- To set up a common base transistor circuit and to study its input and output characteristic and to calculate its current gain.

9. 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.
10. To construct a switch using a transistor and to draw the graph between the input and output voltage and mark the cut-off, saturation and active regions.
11. To study the earth's magnetic field using a tangent galvanometer.

**Prescribed Books:**

1. Physics, Class XI, Part -I and II, Published by NCERT.
2. Physics, Class XII, Part -I and II, Published by NCERT.

## SUGGESTED INVESTIGATORY PROJECTS

### CLASS XII

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 a LDR, because of a variation.
  - (a) in the power of the incandescent lamp, used to 'illuminate' the LDR. (Keeping all the lamps at a fixed distance).
  - (b) in 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, a equiconvex lens, (made from a glass of known refractive index) and an adjustable object needle.
4. To design an appropriate logic gate combinatin for a given truth table.
5. 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.
6. 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.
7. To estimate the charge induced on each one of the two identical styro foam (or pith) balls suspended in a vertical plane by making use of Coulomb's law.
8. To set up a common base transistor circuit and to study its input and output characteristic and to calculate its current gain.
9. 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.
10. To construct a switch using a transistor and to draw the graph between the input and output voltage and mark the cut-off, saturation and active regions.
11. To study the earth's magnatic field using a tangent galvanometer.

**PHYSICS (Code No. 042)**  
**QUESTION PAPER DESIGN**  
**CLASS - XII**

Time 3 Hours

Max. Marks 70

S. No.	Typology of Questions	Very Short Answer (VSA) (1 mark)	Short Answer-I (SA-I) (2 marks)	Short Answer -II (SA-II) (3 marks)	Value based question (4 marks)	Long Answer (LA) (5 marks)	Total Marks	% Weightage
1.	<b>Remembering- (Knowledge based Simple recall questions, to know specific facts, terms, concepts, principles, or theories, Identify, define, or recite, information)</b>	2	1	1	–	–	7	10%
2	<b>Understanding- (Comprehension -to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information)</b>	–	2	4	–	1	21	30%
3	<b>Application (Use abstract information in concrete situation, to apply knowledge to new situations, Use given content to interpret a situation, provide an example, or solve a problem)</b>	–	2	4	–	1	21	30%
4	<b>High Order Thinking Skills (Analysis &amp; Synthesis- Classify, compare, contrast, or differentiate between different pieces of</b>	2	–	1	–	1	10	14%

	information, Organize and/or integrate unique pieces of information from a variety of sources)							
5	Evaluation and Multi-Disciplinary- (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	1	–	2	1	–	11	16%
	<b>TOTAL</b>	5x1=5	5x2=10	12x3=36	1x4=4	3x5=15	70(26)	100%

### QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Questions	Total Marks
VSA	1	5	05
SA-I	2	5	10
SA-II	3	12	36
VBQ	4	1	04
LA	5	3	15
Total		26	70

- 1. Internal Choice** There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 5 marks weightage
- 2. The above template is only a sample** Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same

