

**Physics Class XII (Code N. 042) (2020-21)**  
**Syllabus assigned for Term I (Theory)**

**Time: 90 Minutes**

**Max Marks: 35**

		No. of Periods	Marks
<b>Unit-I</b>	<b>Electrostatics</b>	<b>23</b>	<b>17</b>
	Chapter-1: Electric Charges and Fields		
	Chapter-2: Electrostatic Potential and Capacitance		
<b>Unit-II</b>	<b>Current Electricity</b>	<b>15</b>	
	Chapter-3: Current Electricity		
<b>Unit-III</b>	<b>Magnetic Effects of Current and Magnetism</b>	<b>16</b>	<b>18</b>
	Chapter-4: Moving Charges and Magnetism		
	Chapter-5: Magnetism and Matter		
<b>Unit-IV</b>	<b>Electromagnetic Induction and Alternating Currents</b>	<b>19</b>	
	Chapter-6: Electromagnetic Induction		
	Chapter 7: Alternating currents		
<b>Total</b>		<b>73</b>	<b>35</b>

**Unit I: Electrostatics**

**23 Periods**

**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

**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.

**Unit II: Current Electricity**

**15 Periods**

### **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 laws and simple applications, Wheatstone bridge, metre bridge(**qualitative ideas only**). Potentiometer - principle and its applications to measure potential difference and for comparing EMF of two cells; measurement of internal resistance of a cell (**qualitative ideas only**)

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

**16 Periods**

#### **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 and toroidal solenoids (only qualitative treatment), 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; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter.

#### **Chapter–5: Magnetism and Matter**

Current loop as a magnetic dipole and its magnetic dipole moment, magnetic dipole moment of a revolving electron, bar magnet as an equivalent solenoid, magnetic field lines; earth's magnetic field and magnetic elements.

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

**19 Periods**

#### **Chapter–6: Electromagnetic Induction**

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

#### **Chapter–7: Alternating Current**

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. AC generator and transformer.

## Syllabus assigned for Practical for Term I

Total Periods:16

First term practical examination will be organised by schools as per the directions of CBSE. The record to be submitted by the students at the time of first term examination has to include a record of at least 4 Experiments and 3 Activities to be demonstrated by teacher.

**Time Allowed: one and half hours**

**Max. Marks: 15**

Two experiments to be performed by students at time of examination	8 marks
Practical record [experiments and activities]	2 marks
Viva on experiments, <b>and</b> activities	5 marks
<b>Total</b>	<b>15 marks</b>

### Experiments assigned for Term I

1. To determine resistivity of two / three wires by plotting a graph between potential difference versus current.
2. To find resistance of a given wire / standard resistor using metre bridge.

**OR**

To verify the laws of combination (series) of resistances using a metre bridge.

**OR**

To verify the laws of combination (parallel) of resistances using a metre bridge.

3. To compare the EMF of two given primary cells using potentiometer.

**OR**

To determine the internal resistance of given primary cell using potentiometer.

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.

### Activities assigned for Term I

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 multimeter.
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.

**Class XII Syllabus assigned for Term II (Theory)**

**Time: 2 Hours**

**Max Marks: 35**

		No of Periods	Marks
<b>Unit–V</b>	<b>Electromagnetic Waves</b>	<b>02</b>	<b>17</b>
	Chapter–8: Electromagnetic Waves		
<b>Unit–VI</b>	<b>Optics</b>	<b>18</b>	
	Chapter–9: Ray Optics and Optical Instruments		
	Chapter–10: Wave Optics		
<b>Unit–VII</b>	<b>Dual Nature of Radiation and Matter</b>	<b>07</b>	
	Chapter–11: Dual Nature of Radiation and Matter		
<b>Unit–VIII</b>	<b>Atoms and Nuclei</b>	<b>11</b>	
	Chapter–12: Atoms		
	Chapter–13: Nuclei		
<b>Unit–IX</b>	<b>Electronic Devices</b>	<b>07</b>	<b>7</b>
	Chapter–14: Semiconductor -Electronics: Materials, Devices and Simple Circuits		
<b>Total</b>		<b>45</b>	<b>35</b>

**Unit V: Electromagnetic waves**

**2 Periods**

**Chapter–8: Electromagnetic Waves**

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**

**18Periods**

**Chapter–9: Ray Optics and Optical Instruments**

**Ray Optics:** Refraction of light, total internal reflection and its applications, optical fibers, refraction at spherical 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 and refracting) and their magnifying powers.

**Chapter–10: Wave Optics**

**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

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

**7 Periods**

**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**

**11Periods**

**Chapter–12: Atoms**

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

**Chapter–13: Nuclei** Composition and size of nucleus Nuclear force Mass-energy relation, mass defect, nuclear fission, nuclear fusion.

**Unit IX: Electronic Devices**

**7 Periods**

**Chapter–14: Semiconductor Electronics: Materials, Devices and Simple Circuits** Energy bands in conductors, semiconductors and insulators (qualitative ideas only) Semiconductor diode - I-V characteristics in forward and reverse bias, diode as a rectifier; Special purpose p-n junction diodes: LED, photodiode, solar cell.

**Syllabus assigned for Practical for Term II**

**Total Periods: 16**

The second term practical examination will be organised by schools as per the directions of CBSE and viva will be taken by both internal and external observers. The record to be submitted by the students at the time of second term examination has to include a record of at least 4 Experiments and 3 Activities to be demonstrated by teacher.

**Evaluation Scheme**

**Time Allowed: one and half hours**

**Max. Marks: 15**

Two experiments to be performed by students at time of examination	<b>8 marks</b>
Practical record [experiments and activities]	<b>2 marks</b>
Viva on experiments, <b>and</b> activities	<b>5 marks</b>
<b>Total</b>	<b>15 marks</b>

### Experiments assigned for Term-II

1. To find the focal length of a convex lens by plotting graphs between  $u$  and  $v$  or between  $1/u$  and  $1/v$ .
2. To find the focal length of a convex mirror, using a convex lens.

OR

To find the focal length of a concave lens, using a convex lens.

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

### Activities assigned for Term-II

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 a glass slab.
5. To observe polarization of light using two Polaroids.
6. To observe diffraction of light due to a thin slit.
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).
8. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.

### Practical Examination for Visually Impaired Students of XII

#### Evaluation Scheme (Term I and Term II)

Time Allowed: one hour

Max. Marks:15

Identification/Familiarity with the apparatus	3 marks
Written test (based on given/prescribed practicals)	5 marks
Practical Record	2 marks
Viva	5 marks
<b>Total</b>	<b>15 marks</b>

### Experiments assigned for Term-I

1. To determine the resistance per cm of a given wire by plotting a graph between voltage and current.
2. To verify the laws of combination (series/parallel combination) of resistances by Ohm's law.
3. To find the resistance of a given wire / standard resistor using a meter bridge.
4. To compare the e.m.f of two given primary cells using a potentiometer.
5. To determine the resistance of a galvanometer by half deflection method.

### Experiments assigned for Term-II

- 1 To identify a resistor, capacitor, inductor and diode from a mixed collection of such items.
- 2 To observe the difference between
  - i. a convex lens and a concave lens
  - ii. a convex mirror and a concave mirror and to estimate the likely difference between the power of two given convex /concave lenses.
- 3 To design an inductor coil and to know the effect of
  - i. change in the number of turns
  - ii. Introduction of ferromagnetic material as its core material on the inductance of the coil.
- 4 To design a (i) step up (ii) step down transformer on a given core and know the relation between its input and output voltages.

**Note:** The above practicals may be carried out in an experiential manner rather than recording observations.

#### Prescribed Books:

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

**CLASS XII**

Topis
Chapter-1 Electric charges and fields uniformly charged thin spherical shell (field inside and outside).
Chapter-3 Current Electricity Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors
Chapter-4 Moving Charges and Magnetism Cyclotron
Chapter-5 Magnetism and Matter 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; Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths, permanent magnets.
Chapter-7 Alternating Current power factor, wattless current.
Chapter 8 Electromagnetic Waves Basic idea of displacement current,
Chapter 9 Ray Optics and Optical Instruments Reflection of light, spherical mirrors,(recapitulation) mirror formula , Scattering of light - blue colour of sky and reddish appearance of the sun at sunrise and sunset. resolving power of microscope and astronomical telescope, polarisation, plane polarised light, Brewster's law, uses of plane polarised light and Polaroids.
Chapter-11 Dual Nature of radiation and matter Davisson-Germer experiment

Chapter 13 Nuclei

Radioactivity, alpha, beta and gamma particles/rays and their properties; radioactive decay law, half life and mean life

binding energy per nucleon and its variation with mass number

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

Zener diode and their characteristics, zener diode as a voltage regulator.

Practicals: No investigatory project and Activity to be demonstrated

8 experiments ( clubbed based on skills ) in place of 12