

Tripura Board Class XII Physics Syllabus

Full Marks: 80

Unit I: Electrostatics **Chapter-1: Electric Charges and Fields**

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.

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 **Chapter-3: Current Electricity**

15 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, 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 **Chapter-4: Moving Charges and Magnetism**

16 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 (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 **Chapter-6: Electromagnetic Induction**

19 Periods

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.

Unit V: Electromagnetic waves **Chapter-8: Electromagnetic Waves**

03 Periods

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

18 Periods

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

07 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.

Matter waves-wave nature of particles, de-Broglie relation.

Unit VIII: Atoms and Nuclei

11 Periods

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.

Mass-energy relation, mass defect; nuclear fission, nuclear fusion.

Unit IX: Electronic Devices

07 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 and their characteristics.

PHYSICS PRACTICAL

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

- Record of at least 6 Experiments [with a minimum of 3 from each section], 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.

SECTION–A

Experiments:

1. To determine resistivity of two/three wires by plotting a graph for potential difference versus current.
2. To find resistance of a given wire using metre bridge and hence determine the resistivity (specific resistance) of

its material.

3. 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.

4. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.

Activities (For the purpose of demonstration only):

1. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.
2. To assemble the components of a given electrical circuit.
3. To study the variation in potential drop with length of a wire for a steady current.
4. 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:

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 lens by plotting graphs between u and v or between $1/u$ and $1/v$.
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.
Activities (For the purpose of demonstration only):

1. To identify a diode, an LED, a resistor and a capacitor from a mixed collection of such items.
2. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.
3. 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).

Evaluation Scheme

Time Allowed: Three hours

Maximum Marks: 30

Two experiments one from each section	7+7 Marks
Practical record [experiments and activities]	5 Marks
Attendance	5 Marks
Viva on experiments, activities	6 Marks
Total	30 Marks

Blue Print of Question : CLASS XII :PHYSICS :

Unit	Chapter	VSA (1 Mark)		SA (2 Marks)	LA-I (3 Marks)	LA-II (5 Marks)	Total
		MCQ	Objective type				
Unit-I	Electrostatics						16
	Ch-1: Electric Charges and Fields	1(1x1=1)		1(2x1=2)	–	1(5x1=5) With Intern al Choic e	
	Ch-2: Electrostatic Potential and Capacitance		1(1x1=1)				
Unit-II	Current Electricity						16
	Ch-3: Current Electricity	1(1x1=1)	1(1x1=1) With Intern al Choic e	1(2x1=2)	1(3x1=3)	–	
Unit-III	Magnetic Effects of Current And Magnetism				1(3x1=3) With Internal Choice From Ch-4 and Ch-6	1(5x1=5) With Internal Choice	17
	Ch-4: Moving Charges and Magnetism	–	1(1x1=1)	–			
	Ch-5: Magnetism and Matter	-	1(1x1=1)	1(2x1=2)			
Unit-IV	Electromagnetic Induction and Alternating Currents				1(3x1=3)		18
	Ch-6: Electromagnetic Induction	–	1(1x1=1)	–			
	Ch-7: Alternating Currents	-	1(1x1=1)	-			
Unit-V	Electromagnetic Waves						18
	Electromagnetic Waves	-	-	-	1(3x1=3)	-	
Unit-VI	Optics						18
	Ch-9: Ray Optics and Optical Instruments	-	2(1x2=2)	–	1(3x1=3)	1(5x1=5) With Intern al Choice	
	Ch-10: Wave Optics	1(1x1=1)	2(1x2=2)	1(2x1=2) With Internal Choice	–		

Unit-VII	Dual nature of Radiation and Matter						12
	Ch-11: Dual nature of Radiation and Matter	1(1x1=1)	1(1x1=1)	1(2x1=2) With Internal Choice	–	–	
Unit-VIII	Atoms and Nuclei						
	Ch-12: Atoms	1(1x1=1)	1(1x1=1)		1(3x1=3)	–	
	Ch-13: Nuclei	-	1(1x1=1)	1(2x1=2)		-	
Unit-IX	Electronic Devices						7
	Ch-14: Semiconductor Electronics: Materials, Devices and Simple Circuits.	-	2(1x2=2) One with Internal Choice	1(2x1=2)	1(3x1=3)	–	

Note:- 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.

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DELETED SYLLABUS :PHYSICS : CLASS -XII : 2020-2021

Unit I: Electrostatics

Chapter–1: Electric Charges and Fields

Application of Gauss's theorem to find field due to uniformly charged thin spherical shell (field inside and outside).

Unit II: Current Electricity

Chapter–3: Current Electricity

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

Unit III: Magnetic Effects of Current and Magnetism

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.

Unit IV: Electromagnetic Induction and Alternating Currents

Chapter–7: Alternating Current

Power factor, wattless current.

Unit V: Electromagnetic waves

Chapter–8: Electromagnetic Waves

Basic idea of displacement current.

Unit VI: Optics

Chapter–9: Ray Optics and Optical Instruments

Reflection of light, spherical mirrors, mirror formula.

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

Chapter–10: Wave Optics

Resolving power of microscope and astronomical telescope, polarisation, plane polarised light, Brewster's law, uses of plane polarised light and Polaroids.

Unit VII: Dual Nature of Radiation and Matter

Chapter–11: Dual Nature of Radiation and Matter

Davisson-Germer experiment (experimental details should be omitted; only conclusion should be explained).

Unit VIII: Atoms and Nuclei

Chapter-13: Nuclei

Radioactivity, alpha, beta and gamma particles/rays and their properties; radioactive decay law.
Binding energy per nucleon and its variation with mass number.

Unit IX: Electronic Devices

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

Zener diode and their characteristics, zener diode as a voltage regulator.
Digital electronics and Logic Gates: Logic Gates - NOT Gate, OR Gate, AND Gate, NAND Gate, NOR Gate (simple ideas only).

