PHYSICS – STANDARD XI

UNIT – 1. NATURE OF THE PHYSICAL WORLD AND MEASUREMENT

Expected specific outcomes of learning (1)	Content in Terms of Concepts (2)	Curriculum Transactional Strategies (3)	Illustrations (4)	Evaluation (5)	No. of Periods allotted (6)
Recognises the scientific methods in understanding the basic principles of physics.	1.1.Physics – scope and excitement – physics in relation to technology and society.	Explains the various events in the day to day life related to the physics concepts.	Lists out some scientific phenomena involved in physical world.	What is physics? What is the role of physics in technology?	2
Understands the basic forces in nature.	1.2. Forces in nature, conservation laws – gravitational, electromagnetic and nuclear forces (qualitative ideas)	Identifies the various forces involved in physical world and compares gravitational force with electromagnetic and nuclear forces.	Gives examples for Gravitational force. Electromagnetic force and nuclear force.	Name the different kinds of forces in physics. Explain the nature and range of forces in nature. Give examples of different forces.	3
Understands the need for measurement. Appreciates the accurate measurement of physical quantities. Recognises the possible errors in measurements. Learns to use significant figures in mathematical calculations.	1.3. Measurement – Fundamental and derived units – length, mass and time measurements. Accuracy and precision of measuring instruments. Errors in measurement – Significant figures.	Classifies the two categories of units. Explains the errors in measurement – Expresses results of calculation using signification figures.	Gives examples of fundamental and derived units. Tabulates the prefixes for power of 10. Lists out the various techniques in measuring time intervals.	Explain the need for measurement of physical quantities. State the rules to be followed in using SI units. What is meant by gross error? What is the number of significant figures in 0.0084032?	3
Understands the dimensional formula of physical quantities. Understands the principle of homogeneity of dimensional equation.	1.4. Dimensions - Dimensions of physical quantities - dimensional analysis – Applications.	Obtains the dimensional formula for various physical quantities.	Uses the dimensional method (1) to check the correctness of an equation (2) to establish the relationship between the quantities. Lists out the limitations of dimensional analysis.	Check the correctness of the equations. 1. $F = \frac{mv^2}{r}$ 2. $? \; ? \frac{1}{2l}\sqrt{\frac{T}{m}}$ Obtain the expression for the centripetal force dimensionally.	3
UNIT – 2 - KINEMATICS					
Appreciates the motion of a body in a plane. (Two dimensional)	2.1.Motion in two dimensions – projectile motion – Types	Explains the horizontal projectile and shows	Gives the examples for projectile motion. Proves that	Show that the two angles of projection has the same horizontal	2

	of projectile – Horizontal and oblique projectile.	$Y = Kx^2$ Explains the oblique projectile and calculates the maximum height, time taken to reach maximum height, time of flight and range.	$Y = x \tan ? - \frac{gx^2}{2u^2 \cos^2 ?}$	range. A rifle pointing horizontally at the center of a target fires a bullet at a speed of 200 ms^{-1}, Which strikes the target 5 cm below the centre. How far is the rifle from the target?	
Understands the principle of inertia and appreciates that force is required to overcome inertia.	2.2.Force and inertia, Newton' s first law of motion.	Explains the inertia of rest, inertia of motion and inertia of direction based on Newton's first law.	Defines force and inertia. Gives examples for inertia from daily life.	State Newton' s first law of motion. Define inertia.	2
Relates momentum to force to obtain the mathematical expression for force and understands the impulse - momentum relation.	2.3.Momentum – Newton' s second law of motion – Unit of force – Impulse.	Derives the expression for force (F = ma) (Calculus method) Explains Impulse – momentum theorem.	Explains momentum and states Newton's second law of motion. Measures impulse using force – time graph. Illustrates the practical applications of impulse.	What is the unit of force? What is momentum? A car and lorry are moving with the same speed. Which one of the two has the greater momentum?	2
Recognises that action is the cause of reaction.	2.4.Newton' s third law of motion – Law of conservation of linear momentum and its applications.	Explains Newton' s third law of motion with examples. Proves that the momentum is conserved. Explains the apparent loss of weight in a lift with Newton' s third law.	Applies the law of conservation of momenum to recoil of gun, explosion of bomb and working of rocket and a jet plane.	State Newton' s third law. State and prove law of conservation of momentum.	2
Appreciates the equilibrium of a body due to the action of three forces.	2.5.Equilibrium of concurrent forces triangle law parallelogram law and Lami' s theorem – Experimental proof.	Explains Lami' s theorem. Explains the conditions of equilibrium. Describes an experiment to prove Lami's theorem.	Demonstrates the equilibrium of a body due to concurrent forces.	What are resultant and equilibrium? A body of mass 5 kg is hanging from a weightless string. A horizontal pull F is applied at a point of string due to which the two parts of string inclined an angle of 150^o. Find the force applied and also the tension in the upper part of the string ($g = 10ms^{-2}$).	2

Understands and analyses the motion of a body in circular path. Recognises with examples, the centripetal force and appreciates banking of curves.	2.6.Uniform circular motion – angular velocity – angular acceleration – relation between linear and angular velocities. Centripetal force – motion in a vertical circle – bending of cyclist – vehicle on level circular road – vehicle on banked road.	Explains uniform circular motion. Defines the terms angular velocity and angular acceleration. Describes the motionof a cyclist along a curved path. Derives an expression for centripetal force.	Illustrates the centripetal force provided by gravitational and electromagnetic forces. Observes the motion of a bucket containing water in a verticle circle.	What is the condtion for skidding of vehicles? Explain the motion of a motor cyclist in a globe of death in a circus.	4
Understands the meaning of work in everyday life.	2.7.Work done by a constant force and a variable force. – Unit of work.	Defines work done. Shows that work is a dot product of two vectors. Graphically represents the work done by a variable force.	Lists out the work done by the force, if the body is displaced in different angles with different forces.	A 60 kg man pushes a 20 kg suitcase on wheels a distance of 10m by exerting a constant force of 2N. How much work does he do?	1
Identifies the various forms of energy.	2.8.Energy – Kinetic energy – work – energy theorem – potential energy – power.	Defines kinetic energy and derive an expression for kinetic energy. Discusses the work – energy theorem.	Lists out the various forms of energy. Gives example for work – energy theorem. Explains potential energy with examples.	What is the workdone by a body moving in a circular path? A 1kw motor pumps out water from a well 30 m deep. Calculate the quantity of water pumped out per second?	1
Understands the behaviour of collision between two bodies.	2.9.Collisions – Elastic and in-elastic collisions in one and two dimensions.	Explains two types of collisions. Derives an expression for velocity of bodies after collision.	Mentions the application of elastic collisions.	Distinguish between elastic and inelastic collisions.	2
UNIT – 3 – DYNAMICS OF ROTATIONAL MOTION					
Understands the equilibrium of a rigid body. Appreciates the comparison between linear and rotational motions.	3.1.Centre of a two particle system – generalization – applications – Equilibrium of bodies, rigid body rotation and equation of rotational motion. Comparison of	Explains the rigid body and its centre mass : Explains the equilibrium of a rigid body. Derives the equations of rotational motion. Tabulates the parameters of linear motion and	States the conditions for the equilibrium of rigid bodies. Tabulates the position of centre of mass of some regular bodies.	What is meant by a rigid body? Write the equations of rotational motion.	4

	linear and rotational motions.	rotational motion.			
Recognises the importance of moment of inertia of various bodies.	3.2.Moment of inertia and its physical significance radius of gyration – Theorems with proof. Moment of inertia of circular ring, disc, cylinder, sphere and thin straight rod.	Explains moment of inertia and radius of gyration. Analysis of the physical significance of moment of inertia. Proves the theorems of M.I.	States the factors on which the moment of inertia depends. Derives the expression of M.I. for various bodies. Explains M.I. in terms of rotational kinetic energy.	What is the physical significance of MI? State the theorems of M.I. What is the M.I. of a flywheel?	4
Understands the moment of momentum and force. Appreciates the conservation of angular momentum.	3.3.Moment of force, angular momentum. Torque – conservation of angular momentum.	Defines and explains the angular momentum. Relates the moment of inertia and angular acceleration. Explains the law of conservation of angular momentum.	Illustrates the conservation of angular momentum with examples. (diver, acrobat in circus, a ballet dance)	State the law of conservation of angular momentum. A cat is able to land on its feet after a fall. Which principle of physics is being used?	4
UNIT – 4 SPACE SCIENCE					
Recalls about the solar system in the universe. Understands the motion of the planets around the sun.	4.1.Universe – Milky way galaxy – Helio, Geo centric theory – Kepler's laws of planetary motion.	Explains the laws of motion of planets.	States the Kepler's Laws of planetary motion. Defines perigee and apogee.	State the three laws of planetary motion. If the distance between the earth and the sun were doubled, what would be the new period of earth's orbit around the sun?	2
Recognises the universal law of gravitation. Understands the variation of acceleration due to gravity at different positions on the earth.	4.2.The universal law of gravitation; Acceleration due to gravity and its variation with the altitude, latitude, depth and rotation of the earth. – Mass of the earth. Inertial and Gravitational mass.	Explains Newton' s law of gravitation. Calculates the ' g' – value with the variation of (1) latitude (2) altitude (3) depth and (4) rotation of earth. Differentiates the inertial mass and gravitational mass.	Shows that the ' g' decreases with increase in altitude and depth. Obtains the relation between g and G.	A man can jump 1.5m on earth. Calculate the height he may be able to jump on a planet whose density is ¼ of the earth and radius is 1/3 of the earth.	4
Understands the gravitational field and potential. Appreciates the	4.3.Gravitational field strength – Gravitational potential – Gravitational	Defines and derives the expression for gravitational potential.	States the conditions to be satisfied for the synchronous satellite.	What is the escape velocity of moon? List out the uses of satellites.	3

launching of a satellite and its uses.	potential energy near the surface of the earth – Escape velocity – orbital velocity – Weightlessness – motion of satellite – Rocket propulsion Launching a satellite – orbits and energy. Geo stationary and polar satellites – applications.	Obtains the expressions for escape and orbital velocities. Explains the weightlessness of an astronaut in a spaceship. Calculates the total energy of the satellites in the orbits.	Tabulates the escape velocities of moon and all planets. List out the applications of satellites in communication, remote sensing, meterological, astrophysics and defences.	List out the satellites launched by our country.	
Appreciates the ideas about the planets in the solar system.	4.4.Solar system – sun – Nine planets – Asteroids – Comets – Meteors – Meteroites – size of the planets – Mass of the planet – Temperature and atmosphere.	Explains the objects in the solar system. Explains the atmosphere and temperature of the planets.	Determines the size and mass of the planets. State the presence and absence of the atmosphere.	State the conditions for the presence of atmosphere and life in other planets.	3
Understands the big bang theory.	4.5.Universe – stars constellations – galaxies – origin of universe.	Explains the luminosity of stars. Explains constellations.	States various constellations.	Mention the theories of universe.	2
UNIT – 5 MECHANICS OF SOLIDS AND FLUIDS					
Recalls the four kinds of matter. Undertands the inter-atomic distances and forces.	5.1.States of matter- Inter-atomic and Inter-molecular forces. Conditions for equilibrium – centre of gravity – Applications.	Explains graphically the variation of PE with inter atomic distances. Explains equilibrium of rigid body.	Observes the states of matter. Observes the applications of centre of gravity.	How does P.E. vary with inter atomic distances?	2
Recognises the elastic behaviour of solids.	5.2.Solids – Elastic behaviour, stress – strain relationship, Hooke' s law – experimental verification of Hooke' s law – Three types of moduli of elasticity – applications (crane, bridge) relation between them.	Explains the stress – strain relationship with graph. Describes the experimental verification of Hooke' s law. Explains the three moduli of elasticity. Derives the relation between three moduli of elasticity.	Differentiates elastic and plastic bodies. Observes the extension of a plastic body without increase in force. Discusses the behaviour of a wire using different weights. Determines the Young's modulus of elasticity with Searle's apparatus.	Why springs are made up of steel and not of copper? State Hooke' s law. Explain the elastic properties of matter on the basis of interatomic forces.	4
Appreciates the Pascal' s law and	5.5 Pressure due to a fluid column	Explains the pressure exerted	Proves that P = hpg. Observes the	State Pascal' s law.	3

observes the uses.	– Pascal' s law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure.	by a fluid column. Describes the working of hydraulic lift and brakes. Explains the effect of gravity on fluid pressure.	lifting heavy objects using hydraulic lift.	How does the gravity affect the fluid pressure? Why is the blood pressure in humans greater at the feet than at the brain?	
Understands the idea of surface tension and behaviour of liquid surfaces. Recognises the action of detergents.	5.6.Surface energy and surface tension, angle of contact – application of surface tension in (i) formation of drops and bubbles. (ii) capillary rise. (iii) action of detergents.	Explains S.T. using molecular theory. Relates surface energy and surface tension. Explains the capillary action of liquid and determines the S.T. experimentally. Derives the expression for surface tension by capillary rise.	Gives the examples of surface tension. Gives the examples of capillarity.. Observes the clearing action of detergents.	Define angle of contact : Is it easier to spray water when soap is added to it. Why? Why is it that a needle may float on a clear water, but will sink when some detergent is added to water?	4
Understands the frictional force between the liquid layers. Appreciates the applications of Bernoulli' s theorem.	5.7.Viscosity – Stoke' s law – terminal velocity, streamline flow – turbulant flow – Reynold' s number – Bernoulli' s theorem – applications – lift on an aeroplane wing.	Explains the factors that affect viscous force. Defines coefficient of viscosity. Derives Poiseuille' s formula dimensionally for the flow of liquid through a pipe. Obtains the expression for Stoke' s law. Explains Stokes fall method. Proves Bernoulli' s theorem mathematically.	Distinguishes streamline and turbulent flow. Determines the coefficent of viscocity of very high viscous liquids like grease. Observes the falling of rain drops through air. Lists out the impotance of viscosity. Lists out the applications of Bernouli' s theorem.	Define coefficient of viscosity. What is Reynold' s number? State Bernoulli' s theorem. Why do the clouds float in the sky? A person standing near a fast – moving train has a danger of falling towards the train. Why?	5
UNIT – 6 OSCILLATIONS AND WAVES					
Recognises the motion of certain bodies are periodic / oscillatory	6.1.Periodic motion – period, frequency, displacement as a function of time.	Explains the periodic motion of pendulum, vibrations of stretched string.	Represents graphically the displacement as a function of time.	What is meant by periodic motion and oscillatory motion? Distinguish between them with examples.	1
Understands the various characteristics of SHM periodic motion.	6.2.Simple harmonic motion – amplitude, frequency, phase – uniform – circular motion as SHM.	Defines simple harmonic motion – Explains that simple harmonic motion as the projection of uniform motion on a diameter of a circle and hence deduces expressions for displacement, velocity and acceleration.	Gives some examples of simple harmonic motion. Defines, time period, frequency, angular frequency, phase, phase difference between two vibrating particles. Shows graphically variation of displacement, velocity and acceleration w.r.t.	What is force constant? Write an equation of SHM of a particle with amplitude 0.01m frequency 100 Hz and initial phase of ?/6. What is the phase difference between displacement and acceleration?	2

			time.		
Understands the importance of SHM in oscillating spring and simple pendulum. Observes energy conservation in the motion of a simple pendulum.	6.3.Oscillations of a spring and simple pendulum – derivation of expression for time period – Restoring force – force constant. Energy in SHM. Kinetic and potential energies – Law of conservation of energy.	Discuss the dynamics of harmonic oscillation. Obtains an equation for frequency of oscillations of spring. Shows that oscillations of a simple pendulum are simple harmonic and obtains an expression for time period. Derives the total energy of a particle executing SHM.	Shows that restoring force is proportional to displacement. Applies the law of conservation of energy in oscillating simple pendulum. Names the factors with which the time period of simple pendulum does not depend upon. Represents graphically the values of kinetic and potential energy for different positions of a simple pendulum.	What is the angular frequency of a spring of mass 5 kg and its force constant is $100Nm^{-1}$. Compare the acceleration due to gravity of two places if the time for 100 oscillations of a simple pendulum are 8 min 2 seconds and 8 min 20 seconds. In which position of a simple pendulum is the P.E. maximum?	3
Identifies damped of oscillations and resonance.	6.4.Free, forced and damped oscillations. Resonance, coupled oscillations.	Defines different types of vibrations. Explains resonant vibrations. Explains. Damped oscillation – displacement - time graph. Energy vesses time graph.	Illustrates with example free, forced and damped oscillations. Mentions some examples of coupled oscillations. Lists out the uses of resonance in daily life.	How will you make the damped oscillations into maintained oscillations? What are the advantages and disadvantages of resonance?	2
Understands the propagation of energy in the form of wave motion.	6.5. Wave motion- Longitudinal and transverse waves – relation between ?, ? and ? ?	Defines wave motion and explains the characteristics of wave motion. Defines transverse and longitudinal waves.	Obtains the relationship between frequency and time period, relation between velocity, frequency and wavelength. Distinguishs transverse and longitudinal waves.	What are the characteristics of wave motion?	2
Recognises that sound travels with different speed in different media.	6.6.Speed of wave motion in different media – Newton' s formula – Laplace's correction.	Expresses the formula for velocity of transverse and longitudinal waves in solid, liquid, gases. Deduces the expression for Newton and Laplace's correction.	Explains how the speed of sound varies in different media. Mentions and explains the factors that affect the velocity of sound in air.	Explain why sound can be heared more distinctly at greater distances over a water surface. Does velocity of sound (1) increase with altitude (2) heating?	2

Recalls the propagation of the wave.	6.7.Progressive wave – displacement equation – characteristics.	Obtains an equation for displacement of a plane a progressive wave.	Mentions the characteristics of progressive wave.	What are the characteristics of a progressive wave?	1
Understands the principle of superposition. Understands the principle of standing waves produced in musical instruments.	6.8.Superposition principle. Interference – Intensity and sound level. Beats standing waves (mathematical treatment) – Standing waves in strings and pipes – Sonometer – Resonance air column – fundamental mode and harmonics.	Explains the principle of superposition phenomenon 1) Interference 2) beats 3) stationary waves Defines stationary waves. Obtains expression for stationary waves. Mentions the characteristics of stationary waves. Explains the modes of vibration of air column in pipes. Explains Resonance column experiment to obtain velocity of sound.	Demonstrates interference of sound in laboratory. Mentions the uses of beats- compares stationary and progressive waves. Determines the velocity of sound using resonance column apparatus.	In an experiment, the tuning fork and sonometer wire gives 4 beats per sec, when the length of wire is 1m and 1.05m. What is its frequency? What principle is used in stethoscope? Write the laws of vibrations of stretched strings.	3
Understands Doppler effect and its applications.	6.9.Doppler effect (quantitative idea) – applications.	Derives expressions for apparent frequency of sound in different cases.	Discusses various applications of Doppler effect.	The source and observer approaches each other with a velocity 30 ms^{-1}. If the real frequency of source is 750 Hz. What is its apparent frequency?	2
UNIT – 7 – HEAT AND THERMODYNAMICS					
Understands the postulates of kinetic theory of gases. Recognises the collision of molecules hence the pressure exerted by the gas. Appreciates the ideas of degrees of freedom and law of	7.1.Kinetic theory of gases – postulates – pressure of a gas – Kinetic energy and temperature – degrees of freedom – law of equipartition of energy – Avogadro' s number.	States the postulates of kinetic theory of gases. Derives the expression for pressure of a gas. Relates kinetic energy with pressure. Defines degrees of freedom. States law of equipartition of	Lists out the postulates of kinetic theory of gases. Observes that the KE is directly proportional to the temperature. Gives example of mono, di and triatomic molecules.	What is meant by free path? How does a gas exert pressure? What is the relation between kinetic energy and temperature? What is the energy of molecule per degree of freedom?	2

equipartition of energy.		energy. Calculates the energy of monoatomic, diatomic and triatomic molecules.			
Understands the zeroth law of thermo dynamics based on thermal equilibrium. Appreciates that heat required to raise the temperature of a substance.	7.2.Thermal equilibrium and temperature (zeroth law of thermodynamics) Heat, work and internal energy. Specific heat – specific heat capacity of gases at constant volume and pressure. Relation between C_p and C_v. (mono atomic and diatomic).	Explains thermal equilibrium and zeroth law of thermodynamics. Analyses why C_p is always greater than C_v. Derives the relation between C_p and C_v.	Defines specific heat capacity at constant pressure and volume. Obtains the relation between C_p and C_v.	State zenoth law of thermodynamics. What is absolute zero of temperature? Calculate C_p and C_r for argon.	3
Understands the relation between work and heat. Appreciates the principle of refrigeration.	7.3First law of thermodynamics – work done by thermodynamical system – Reversible and irreversible processes – isothermal and adiabatic processes. Carnot engine – refrigerator - efficiency – second law of thermodynamics.	Explains and states first law of thermodynamics. Draws PV diagram. Explains the isothermal and adiabatic processes. Describes the parts and working of Carnot engine. Explains the principle of refrigeration with diagram.	Observes that the area of P-V diagram is equal to the amount of work done by the system. Compares isothermal and adiabatic processes. Identifies the work done by the Carnot engine from the indicator diagram. Compares the principle of Carnot engine and refrigerator.	State the first law of thermodynamics. Distinguish isothermal and adiabatic process. What is an indicator diagram? The efficiency of heat engine is always less than 100%. why?	5
preciates the various modes of transfer of heat energy	7.4.Transfer of heat – conduction. convection and radiation – Thermal conductivity of solids – black body radiation. Prevost' s theory – Kirchhoff's law. – Wien' s displacement law, Stefan' s law (statements only). Newton's	Explains the transfer of heat by (1) conduction (2) convection and (3) radiation. Explains and defines thermal conductivity. Defines the black body radiation. Calculates the surface temperature of the sun. Describes the working of	Lists out the applications of thermal conduction in daily life. Observes that the emissive power and absorptive power is maximum for a black body. Gives out the applications of Kirchhoff' s law.	Discuss the Prevost theory of heat exchange. What is a perfect black body? What are the properties of radiation? Why is the electric Iron highly polished? Define solar constant. What are Fraunhofer lines?	6

	law of cooling – solar constant and surface temperature of the sun- pyroheliometer.	pyroheliometer. Explains the cooling by radiation with cooling curve. Explains Kirchhoff' s law concerning the relation between absorptive power and emissive power of a body.		To what temperature must a black body be raised in order to double the total radiation, If the original temperature is 727^{o}C?	
UNIT – 8 RAY OPTICS					
Recognises the reflection phenomena. Understands total internal reflection. Appreciates the determination of velocity of light its physical significance.	8.1 Reflection of light – Reflection at plane and curved surfaces. Total internal refelction and its applications. – Determination of velocity of light – Michelson' s method	Explains the reflection phenomena. Explains the condition of total internal refelection. Explains the applications of total internal reflection. Explains the formation of image of a point in a plane mirror.	States the laws of reflection. Shows that the reflected light turns by 2? when mirror turns by ? ?	State the conditions of total internal reflection. What is the velocity of light? How is it determined?	4
Understands the lens formula.	8.2 Refraction – spherical lenses – Thin lens formula. Lens makers formula – magnification – power of lens – combination of thin lenses in contact.	Derives the expressions for the thin lens formula. Explains the power of a lens.	Proves the lens makers formula $\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ Establishes $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$	Derive the lens makers formula.	4
Recognises the refraction of light through a prism.	8.3 Refraction of light through a prism. Dispersion – spectro- meter – Determination of ? – Rainbow (analytical treatment)	Explains the refraction and dispersion of light in prism. Describes the spectrometer. Gives the analytical treatment of rainbows.	Derives the relation $\mu = \frac{\sin\frac{A+D}{2}}{\sin\frac{A}{2}}$. Derives the dispersive power of a prism. Describes the determi-nation of ? by determining A and D. Also by plotting i–d curve. Explains the main features of primary and secondary rainbows.	Explain the cause of dispersion	4
Unit 9 ELECTROSTATICS					
Recognizes the two types of charges and change conservation.	9.1 Frictional electricity, charges and their conservation;	Explains the distribution of charges due to friction. States Coulomb's	Observes the attraction between unlike charges and repulsion between like charges using	State Coulomb' s inverse square laws. Two small equal unlike charges 2 x	3

Understands the force of attraction and repulstion between charges.	Coulomb' s law – forces between two point electric charges. Forces between multiple electric charges – superposition principle and continuous charge distribution.	law of forces between like charges and unlike charges. Finds the resultant force due to number of charges.	pithball pendulum. Calculates the force between multiple charges vectorially.	10^{-8}C are placed at A and B, seperated by 6 cm. Find the force on a charge 1 x 10^{-8}C placed at C. where C is 4 cm from the line AB along the perpendicular bisector ACB.	
Understands the field around a charge and dipole. Recognises the electric dipole system of hydrogen atom.	9.2 Electric field – Electric field due to a point charge, electric field lines; Electric dipole – electric field intensity due to a dipole – behaviour of dipole in a uniform electric field – application of electric dipole in microwave oven.	Explains the electric field. Derives the expression for electric field due to a point charge and dipole. Discusses the torque acting on the dipole placed in electrifc field. Explains the role water molecule which is a dipole in a microwave oven.	Lists out the properties of electric lines of forces. Defines electric dipole. Calculates dipole moment. Shows that the negative potential gradient is electric field.	What is an electric dipole? What are the properties of electric lines of forces? What happens to the electric dipole when it is placed in a uniform electric field?	4
Understands the concept of electric potential and potential energy.	9.3 Electric potential – potential difference – electric potential due to a point charge and due a dipole. Equipotential surfaces – Electrical potential energy of a system of two point charges.	Explains the electric potential and potential difference. Derives the expressions for electric potential due to a point charge and a dipole. Explains the electric potential energy.	Defines the unit of potential. Explains the equipotenial surfaces.	Define electric potential. Calculate electric potential energy of electron – proton system of hydrogen atom. What is the relation between potential and electric field?	4
Understands the electric flux. Applies Gauss' s theorem to find the electric field due to a charged body	9.4.Electric flux – Gauss' s theorem and its applications to find field due to (1) infinitely long straight wire, (2) uniformly charged infinite plane sheet (3) two parallel sheets and (4) uniformly charged thin spherical shell (inside and outside)	Explains electric flux and its unit. States Gauss theorem. Explains how to calculate the electric field due to a charged wire, plane sheet and spherical shell	Lists out the applications of Gauss theorem. Uses the scalar product of two vectors to calculate the electric flux.	What is electric flux? State Gauss theorem. What is charge density?	3

Understands the charging of a body by induction. Recognises the uses of capacitors. Understands the working of lightning arrestor and van de Graff generator.	9.5.Electrostatic induction – capacitor and capacitance – Dielectric and electric polarization – parallel plate capacitor with and without dielectric medium. Applications of capacitor – energy stored in a capacitor. Capacitors in series and in parallel – action of points – Lightning arrester – Van de Graff generator -	Explains the principle of capacitor. Explains the alignment of charges in a dielectric. Obtains the expression for capacitance of a parallel plate capacitor. Knows the effect of dielectric in a parallel plate capacitor. Describes the construction and working of a lightning arrestor and Van de Graff generator.	Lists out the applications of capacitor. Obtains the effective capacitance of capacitors connected in series and in parallel. Defines capacitance. Proves the increase in capacitance with increase in thickness of dielectric. Explains the energy stored in a capacitor.	What happens to the capacitance of a parallel plate capacitor if the seperation of plates is doubled? A 5 ?F capacitor is charged to a potential difference of 800 V and discharged through a conductor. How much energy is given to the conductor during the discharge. Describe the construction and working of a Van de Graff generator.	4
Unit – 10. MAGNETISM					
Appreciates the earth' s magnetic elements.	10.1. Earth's magnetic field and magnetic elements.	Defines and explains the dip, declination and horizontal intensity.	Explains the method of finding dip and declination.	What are the elements of earth' s magnetic field?	2
Applies the magnetic intensity due to a magnetic dipole.	10.2.Magnetic field intensity due to magnetic dipole (bar magnet) along the axis and perpendicular to the axis.	Obtains an expression for magnetic field intensity at a point on the axial line and perpendicular to the axis.	Observes the neutral points lie along the axis of a magnet and the orientation of the magnet with respect to earth' s magnetic field.	Derive and expression for magnetic field intensity at a point on the axial line and perpendicular to the axis.	2
Understands the tangent law and applies the knowledge in measuring magnetic moment.	10.3.Tangent law – Deflection magnetometer - TanA and - Tan B positions.	States tangent law and uses the law in deflection magnetometer. Compares the magnetic moments of magnet of different sizes.	Demonstrates the ratio of magnetic moment of two given short magnets experimentally.	State and explain tangent law. Mention the precautions while setting the mangetometer.	2
Understands the Torque experienced by a dipole placed in uniform magnetic field	10.4 Torque on a magnetic dipole (bar magnet) in a uniform magnetic field.	Explains Torque on a magnetic dipole in a uniform magnetic field.	Derives an expression for the Torque and finds the direction of torque Gives its SI unit.	Define magnet dipole and dipole moment.	1
Observes the magnetic lines around a magnet.	10.5.Bar magnet - magnetic field lines	Explains the formation of magnetic field lines of forces.	Mention the properties of magnetic lines of forces.	Draw magnetic field lines in bar magnet.	2
Understands the intensity of magnetisation.	10.6 Magnetic properties of materials – Intensity of	Defines intensity of magnetization, magnetic susceptibility,	Tabulates the susceptibilities and permeabilities of materials.	Define magnetic permeability.	2

	magnetization magnetic susceptibility, magnetic induction and permeability	magnetic induction and permeability			
Identifies the classification of materials.	10.7.Dia, Para, ferro magnetic substances with example.	Explains the properties of diamagnetic, para and ferromagnetic substances.	List out the properties of dia, para and ferro magnetic materials.	Define curie temperature.	2
Identifies the material having high retentivity.	10.8.Hysterisis	Explains the retentivity and coercivity of a substance.	Draws Hysteresis loop for soft iron core.	Which material is used for electromagnet?	1

STANDARD XI

PHYSICS - PRACTICALS

Practicals to be done by choosing any four experiments from each group.

GROUP A

1. Vernier callipers

(1) To measure diameter of a cylindrical object / spherical object. Find its volume and surface area.

(2) To measure internal diameter and depth of a given beaker and hence find its volume.

2. Screw gauge.

(1) To find the diameter of wire using a screw gauge and compare it by wrapping the same wire around a pencil and explain its difference.

(2) Find the thickness of (1) a glass plate and (2) thickness of a sheet of paper from observed thickness of 20 sheets paper.

3. Physical Balance

(1) To determine the mass of two different objects using physical balance.

(2) To determine the mass of a body in air and in water. Find its relative density.

4. To find the density of the material of a given wire with the help of a screw gauge and a physical balance.

5. Simple pendulum.

(1) To find the time period of a simple pendulum and hence find acceleration due to gravity.

(2) To draw graphs between L and T and L and T^2 and to decide which is better.

(3) Find the length of a seconds pendulum from the graph between L and T^2.

6. (1) To verify the parallelogram law of forces, triangle law of forces and Lami' s theorem.

(2) To find the unknown weight of a body by the method of vector addition of forces.

7. Measure the mass and dimensions of (1) rod (2) rectangular plate (3) hollow cylinder (4) solid cylinder (5) hollow sphere (6) solid sphere. Calculate the moment of inertia.

8. To find radius of capillary tube by of mercury Pellet method.

GROUP B

1. To determine Youngs modulus of the material of a given wire by using Searles' apparatus.

2. To find the spring constant of a spring by method of oscillations.

3. To study the rate of cooling of molten wax (or napthalene) Draw graph between time and temperature.

4. To determine the surface tension of water by capillary rise method.

5. To determine the coefficient of viscosity by Poiseuille' s - flow method.

6. To determine the coefficient of viscosity of a given viscous liquid by measuring the terminal velocity of a given spherical body.

7. To verify the laws of a stretched string using a sonometer.

8. To determine the frequency of a tuning fork and weight of the stone using a sonometer.

GROUP - C

1. To find the velocity of sound in air at room temperature using the resonance column apparatus.

2. To study the relationship between the time and temperature in cooing of objects. verification of Newtons law of cooling.

3. Solar constant - to find solar constant.

4. To determine the moment of inertia of a circular disc.

5. To find the refractive index of water using a travelling microscope.

6. To determine the focal length of (1) a concave mirror (2) a convex mirror using a convex lens.

7. To establish the current - voltage relationship (Ohm' s law) for a conductor and finds its resistance.

8. To plot a magnetic field due to a bar magnet.

(1) Placed in the magnetic meridian with its North pole pointing south and to locate the neutral points.

(2) North pole pointing North and locate null points.