



LORD MAHAVIRA SCHOOL

Sector-29, Noida, 201303

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LESSON PLAN

SUBJECT: PHYSICS (042)

Class XI

(BOOKS: NCERT TEXT BOOK/ REFERENCE BOOKS)

MONTH	UNIT	CHAPTERS/ SUB TOPICS	EXPERIMENTS & ACTIVITIES
JULY	UNIT-I PHYSICAL WORLD AND MEASUREMENT	Chapter-2: Units and Measurements Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. significant figures. Dimensions of physical quantities, dimensional analysis and its applications.	Ex 1 - 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.
	UNIT-II KINEMATICS	Chapter-3: Motion in a Straight Line Frame of reference, Motion in a straight line, Elementary concepts of differentiation and integration for describing motion, uniform and non- uniform motion, and instantaneous velocity, uniformly accelerated motion, velocity - time and position-time graphs. Relations for uniformly accelerated motion (graphical treatment).	Activity 1 - To make a paper scale of given least count
		Chapter-4: Motion in a Plane 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, 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	Chapter-5: Laws of Motion	Ex- 2 To measure diameter of a

	Laws of Motion	<p>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.</p> <p>Equilibrium of concurrent forces, Static and kinetic friction, laws of friction, rolling friction, lubrication.</p> <p>Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on a banked</p>	<p>given wire and thickness of a given sheet using screw gauge</p> <p>ACTIVITY 2- To determine mass of a given body using a metre scale by principle of moments.</p>
August	Unit-IV	Work, Energy and Power	
		<p>Chapter-6: Work, Energy and Power</p> <p>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: non-conservative forces, motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.</p>	EX- 3 To study variation of time period of a simple pendulum of a given length by taking bobs of same size but different masses and interpret the result.
	Unit-V	Motion of System of Particles and Rigid Body	
		<p>Chapter-7: System of Particles and Rotational Motion</p> <p>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, law 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).</p>	ACTIVITY 3 - To study the conservation of energy of a ball rolling down on an inclined plane (using a double inclined plane).
	Unit-VI	Gravitation	

		<p>Chapter–8: Gravitation Kepler's laws of planetary motion, universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy and gravitational potential, escape speed orbital velocity of a satellite</p>	<p>EX 4 - 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 θ by plotting graph between force and $\text{Sin}\theta$.</p>
SEPTEMBER		REVISION AND TERM 1 EXAM	
OCTOBER	Unit–VII PROPERTIES OF BULK MATTER	<p>Chapter–9: Mechanical Properties of Solids Elasticity, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity (qualitative idea only), Poisson's ratio; elastic energy.</p>	<p>EX – 5 To find the force constant of a helical spring by plotting a graph between load and extension.</p>
NOVEMBER		<p>Chapter–10: Mechanical Properties of Fluids 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 simple 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</p>	<p>ACTIVITY 4 - To observe change of state and plot a cooling curve for molten wax</p>
		<p>Chapter–11: Thermal Properties of Matter 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</p>	<p>EX – 6 To determine Young's modulus of elasticity of the material of a given wire.</p>
	UNIT–VIII	THERMODYNAMICS	
		<p>Chapter–12: Thermodynamics Thermal equilibrium and definition of temperature, zeroth law</p>	

		of thermodynamics, heat, work and internal energy. First law of thermodynamics, Second law of thermodynamics: gaseous state of matter, change of condition of gaseous state -isothermal, adiabatic, reversible, irreversible, and cyclic processes	EX – 7 To determine the surface tension of water by capillary rise method.
DECEMBER	UNIT-IX	BEHAVIORS OF PERFECT GASES AND KINETIC THEORY OF GASES	
		Chapter-13: Kinetic Theory 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.	ACTIVITY 5 - To note the change in level of liquid in a container on heating and interpret the observations.
	Unit-X	Oscillations and Waves	

JANUARY		<p>Chapter–14: Oscillations</p> <p>Periodic motion - time period, frequency, displacement as a function of time, periodic functions and their applications.</p> <p>Simple harmonic motion (S.H.M) and its equations of motion; phase; oscillations of a loaded spring- restoring force and force constant; energy in S.H.M.</p> <p>Kinetic and potential energies; simple pendulum derivation of expression for its time period.</p> <p>Chapter–15: Waves</p> <p>Wave motion: Transverse and longitudinal waves, speed of travelling wave, 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</p>	<p>EX – 8 To find the speed of sound in air at room temperature using a resonance tube by two resonance positions.</p> <p>ACTIVITY 6 - To observe the decrease in pressure with increase in velocity of a fluid.</p>
FEBRUARY		.REVISION FOR TERM 2 EXAM	
MARCH		TERM 2 EXAM	



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Class XII

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MONTH	UNIT	CHAPTERS	EXPERIMENTS AND ACTIVITIES
APRIL	Unit-I Electrostatics	<p>Chapter-1: <u>Electric Charges and Fields</u></p> <p>Electric charges, Conservation of charge, Coulomb's law-force between two-point charges, forces between multiple charges; superposition principle and continuous charge distribution</p> <p>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)</p> <p>Chapter-2: <u>Electrostatic Potential and Capacitance</u></p> <p>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.</p> <p>Dielectrics and electric polarization, 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 (no derivation, formulae only).</p>	<p>Experiment - To determine resistivity of two / three wires by plotting a graph for potential difference versus current.</p> <p>Experiment - To find resistance of a given wire / standard resistor using metre bridge.</p>
APRIL	Unit – II Current Electricity	<p>Chapter – 3 Current Electricity</p> <p>Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, 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</p>	<p>ACTIVITY - To measure the resistance and impedance of an inductor with or without iron core.</p>

		cells in series and in parallel, Kirchoff's rules, Wheatstone bridge.	
May	Unit-III Magnetic effect of Current and magnetism	<p>Chapter 4 – Moving charges</p> <p>Concept of magnetic field, Oersted's experiment. Biot – Savart Law and its application to current carrying circular loop. Ampere law and its applications to infinitely long straight wire. Straight solenoid (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; Current loop as a magnetic dipole and its magnetic dipole moment, moving coil galvanometer its current sensitivity and conversion to ammeter and voltmeter.</p> <p>Chapter 5 – Magnetism and Matter</p> <p>Bar magnet, bar magnet as an equivalent solenoid (qualitative treatment only), magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis (qualitative treatment only), torque on a magnetic dipole (bar magnet) in a uniform magnetic field (qualitative treatment only), magnetic field lines.</p> <p>Magnetic properties of materials- Para-, dia- and ferro - magnetic substances with examples, Magnetization of materials, effect of temperature on magnetic properties.</p>	<p>Experiment - To determine resistance of a galvanometer by half-deflection method and to find its figure of merit</p> <p>Activity -To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multimeter.</p>

JULY	Unit – IV Electromagnetic Induction and alternating Currents	Chapter 6 – Electromagnetism Electromagnetic induction; Faraday's laws, induced EMF and current; Lenz's Law, Self and mutual induction. Chapter 7 – Alternating current Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LCR series circuit (phasors only), resonance, power in AC circuits, power factor, wattless current. AC generator, Transformer.	Experiment - To convert the given galvanometer (of known resistance and figure of merit) into a voltmeter of desired range and to verify the same. Activity - To study the variation in potential drop with length of a wire for a steady current
JULY	Unit V Electromagnetic waves	Chapter 8 – Electromagnetic Waves Basic idea of displacement current, Electromagnetic waves, their characteristics, their transverse nature (qualitative idea only). Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.	
	Unit VI Optics	Chapter – 9 Ray optics and optical instruments Ray Optics: Reflection of light, spherical mirrors, mirror formula, refraction of light, total internal reflection and optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens maker'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.	Experiment - To find the value of v for different values of u in case of a concave mirror and to find the focal length

AUGUST		<p>Chapter 10 – Wave optics</p> <p>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 (No derivation final expression only), coherent sources and sustained interference of light, diffraction due to a single slit, width of central maxima (qualitative treatment only)</p>	<p>Activity - To identify a diode, an LED, a resistor and a capacitor from a mixed collection of such items.</p>
SEPTEMBER		<p>REVISION AND TERM 1 EXAM</p>	
OCTOBER	<p>Unit VII Dual Nature Of Radiation and Matter</p>	<p>Chapter – 11 Dual nature of radiation and matter</p> <p>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</p>	<p>Experiment - To find the focal length of a convex mirror, using a convex lens.</p> <p>Activity - To study effect of intensity of light (by varying distance of the source) on an LDR.</p>
NOVEMBER	<p>Unit VIII Atoms and Nuclei</p>	<p>Chapter 12 – Atoms</p> <p>Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model of hydrogen atom, Expression for radius of nth possible orbit, velocity and energy of electron in his orbit, of hydrogen line spectra (qualitative treatment only)</p> <p>Chapter 13- Nuclei</p> <p>Composition and size of nucleus, nuclear force, Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission, nuclear fusion.</p>	<p>Experiment- To find the focal length of a convex lens by plotting graphs between u and v or between $1/u$ and $1/v$</p> <p>Activity - To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.</p>

DECEMBER	Unit IX Electronic Devices	Chapter – 14 Semiconductor Electronics: Materials, Devices and Simple Circuits Energy bands in conductors, semiconductors and insulators (qualitative ideas only) Intrinsic and extrinsic semiconductors- p and n type, p-n junction. Semiconductor diode - I-V characteristics in forward and reverse bias, application of junction diode -diode as a rectifier.	Experiment - To find the focal length of a concave lens, using a convex lens. Activity - To observe diffraction of light due to a thin slit
JANUARY		REVISION AND PRE BOARD EXAM	
FEBRUARY		RENEDIAL CLASSES AND PRACTICALS	