

SYLLABUS

PHYSICS

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.

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).

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: Laws of Motion

Chapter–5: Laws of Motion

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 a banked road)

Unit IV: Work, Energy and Power

Chapter–6: Work, Energy and Power

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.

Unit V: Motion of System of Particles and Rigid Body

Chapter–7: System of Particles and Rotational Motion

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).

Unit VI: Gravitation

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

Unit VII: Properties of Bulk Matter

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.

Chapter–10: Mechanical Properties of Fluid

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.

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 .

Unit VIII: Thermodynamics

Chapter–12: Thermodynamics

Thermal equilibrium and definition of temperature, zeroth law 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.

Unit IX: Behavior 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.

Unit X: Oscillations and Waves

Chapter–14: Oscillations

Periodic motion - time period, frequency, displacement as a function of time, periodic functions and their applications.

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.

Kinetic and potential energies; simple pendulum derivation of expression for its time period.

Chapter–15: Waves

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.

Unit I: Electrostatics

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 and uniformly charged thin spherical shell (field inside and outside).

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 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).

Unit II: Current Electricity

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, 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 rules, Wheatstone bridge.

Unit III: Magnetic Effects of Current and Magnetism

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 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.

Chapter–5: Magnetism and Matter

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. Magnetic properties of materials- Para-, dia- and ferro - magnetic substances with examples, Magnetization of materials, effect of temperature on magnetic properties.

Unit IV: Electromagnetic Induction and Alternating Currents

Chapter–6: Electromagnetic Induction

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.

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.

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 (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).

Unit VII: Dual Nature of Radiation and Matter

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

Chapter–12: Atoms

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 nth orbit, hydrogen line spectra (qualitative treatment only).

Chapter–13: Nuclei

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.

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.

CHEMISTRY

Unit I: Some Basic Concepts of Chemistry

General Introduction: Importance and scope of Chemistry. Nature of matter, laws of chemical combination, Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.

Unit II: Structure of Atom

Discovery of Electron, Proton and Neutron, atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of atoms, stability of half-filled and completely filled orbitals.

Unit III: Classification of Elements and Periodicity in Properties

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas radii, Ionization enthalpy, electron gain enthalpy, electronegativity, valency. Nomenclature of elements with atomic number greater than 100.

Unit IV: Chemical Bonding and Molecular Structure

Valence electrons, ionic bond, covalent bond, bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s, p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules(qualitative idea only), Hydrogen bond.

Unit V: Chemical Thermodynamics

Concepts of System and types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions. First law of thermodynamics -internal energy and enthalpy, heat capacity and specific heat, measurement of U and H, Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Second law of Thermodynamics (brief introduction) Introduction of entropy as a state function, Gibb's energy change for spontaneous and nonspontaneous processes, criteria for equilibrium. Third law of thermodynamics (brief introduction).

Unit VI: Equilibrium

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium - Le Chatelier's principle, ionic equilibrium- ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of poly basic acids, acid strength, concept of pH, hydrolysis of salts (elementary idea), buffer solution, Henderson Equation, solubility product, common ion effect (with illustrative examples).

Unit VII: Redox Reactions

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and

gain of electrons and change in oxidation number, applications of redox reactions.

Unit VIII: Organic Chemistry -Some Basic Principles and Techniques

General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyper conjugation. Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions.

Unit IX: Hydrocarbons

Classification of Hydrocarbons Aliphatic Hydrocarbons: Alkanes - Nomenclature, isomerism, conformation (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis. Alkenes - Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition. Alkynes - Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water. Aromatic Hydrocarbons: Introduction, IUPAC nomenclature, benzene: resonance, aromaticity, chemical properties: mechanism of electrophilic substitution. Nitration, sulphonation, halogenation, Friedel Craft's alkylation and acylation, directive influence of functional group in monosubstituted benzene. Carcinogenicity and toxicity.

Unit I: Solutions

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, Raoult's law, colligative properties - relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Van't Hoff factor.

Unit II: Electrochemistry

Redox reactions, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, Relation between Gibbs energy change and EMF of a cell, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and law of electrolysis (elementary idea), dry cell-electrolytic cells and Galvanic cells, lead accumulator, fuel cells, corrosion.

Unit III: Chemical Kinetics

Rate of a reaction (Average and instantaneous), factors affecting rate of reaction: concentration, temperature, catalyst; order and molecularity of a reaction, rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions), concept of collision theory (elementary idea, no mathematical treatment), activation energy, Arrhenius equation.

Unit IV: d and f Block Elements

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour,

catalytic property, magnetic properties, interstitial compounds, alloy formation, preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$. Lanthanoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences. Actinoids - Electronic configuration, oxidation states and comparison with lanthanoids.

Unit V: Coordination Compounds

Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's theory, VBT, and CFT; structure and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system).

Unit VI: Haloalkanes and Haloarenes.

Haloalkanes: Nomenclature, nature of C–X bond, physical and chemical properties, optical rotation mechanism of substitution reactions. Haloarenes: Nature of C–X bond, substitution reactions (Directive influence of halogen in monosubstituted compounds only). Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

Unit VII: Alcohols, Phenols and Ethers

Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only), identification of primary, secondary and tertiary alcohols, mechanism of dehydration, uses with special reference to methanol and ethanol. Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols. Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses.

Unit VIII: Aldehydes, Ketones and Carboxylic Acids

Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes, uses. Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

Unit IX: Amines

Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines. Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.

Unit X: Biomolecules

Carbohydrates - Classification (aldoses and ketoses), monosaccharides (glucose and fructose), D-L configuration oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); Importance of carbohydrates. Proteins -Elementary idea of - amino acids, peptide bond, polypeptides, proteins, structure of proteins - primary, secondary, tertiary structure and quaternary structures (qualitative idea only), denaturation of proteins; enzymes. Hormones - Elementary idea excluding structure. Vitamins - Classification and functions. Nucleic Acids: DNA and RNA.

MATHEMATICS

Chapter 1 Rational Numbers

Chapter 2 Linear Equations in One Variable

Chapter 3 Understanding Quadrilaterals

Chapter 4 Data Handling

Chapter 5 Squares and Square Roots

Chapter 6 Cubes and Cube Roots

Chapter 7 Comparing Quantities

Chapter 8 Algebraic Expressions and Identities

Chapter 9 Mensuration

Chapter 10 Exponents and Powers

Chapter 11 Direct and Inverse Proportions

Chapter 12 Factorisation

Chapter 13 Introduction to Graphs

UNIT I: NUMBER SYSTEMS

1. REAL NUMBERS

- a) Review of representation of natural numbers, integers, and rational numbers on the number line. Rational numbers as recurring/ terminating decimals. Operations on real numbers.
- b) Examples of non-recurring/non-terminating decimals. Existence of non-rational numbers (irrational numbers) such as $\sqrt{2}$, and their representation on the number line. Explaining that every real number is represented by a unique point on the number line and conversely, viz. every point on the number line represents a unique real number.
- c) Definition of n th root of a real number.
- d) Rationalization (with precise meaning) of real numbers of the type $\frac{a}{\sqrt{b}}$ and $\frac{a}{\sqrt{b} + \sqrt{c}}$ (and their combinations) where x and y are natural number and a and b are integers.
- e) Recall of laws of exponents with integral powers. Rational exponents with positive real bases (to be done by particular cases, allowing learner to arrive at the general laws.)

UNIT II: ALGEBRA

1. POLYNOMIALS

Definition of a polynomial in one variable, with examples and counter examples. Coefficients of a polynomial, terms of a polynomial and zero polynomial. Degree of a polynomial. Constant, linear, quadratic and cubic polynomials. Monomials, binomials, trinomials. Factors and multiples. Zeros of a polynomial. Motivate and State the Remainder Theorem with examples. Statement and proof of the Factor Theorem. Factorization of $ax^2 + bx + c$, $a \neq 0$ where a , b and c are real numbers, and of cubic polynomials using the Factor Theorem. Recall of algebraic expressions and identities. Verification of identities: $(a+b)^2$ and their use in factorization of polynomials.

2. LINEAR EQUATIONS IN TWO VARIABLES

Recall of linear equations in one variable. Introduction to the equation in two variables. Focus on linear equations of the type $ax + by + c = 0$. Explain that a linear equation in two variables has infinitely many solutions and justify their being written as ordered pairs of real numbers, plotting them and showing that they lie on a line.

UNIT III: COORDINATE GEOMETRY COORDINATE GEOMETRY

The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations.

UNIT IV: GEOMETRY

1. INTRODUCTION TO EUCLID'S GEOMETRY

History - Geometry in India and Euclid's geometry. Euclid's method of formalizing observed phenomenon into rigorous Mathematics with definitions, common/obvious notions, axioms/postulates and theorems. The five postulates of Euclid. Showing the relationship between axiom and theorem, for example: (Axiom) 1. Given two distinct points, there exists one and only one line through them. (Theorem)

Two distinct lines cannot have more than one point in common.

2. LINES AND ANGLES

- a) If a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and the converse.
- b) If two lines intersect, vertically opposite angles are equal.
- c) Lines which are parallel to a given line are parallel.

3. TRIANGLES .

- a) Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of the other triangle (SAS Congruence).
- b) Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle (ASA Congruence).
- c) Two triangles are congruent if the three sides of one triangle are equal to three sides of the other triangle (SSS Congruence).
- d) Two right triangles are congruent if the hypotenuse and a side of one triangle are equal (respectively) to the hypotenuse and a side of the other triangle. (RHS Congruence)
- e) The angles opposite to equal sides of a triangle are equal.
- f) The sides opposite to equal angles of a triangle are equal.

4. QUADRILATERALS

- a) The diagonal divides a parallelogram into two congruent triangles.
- b) In a parallelogram opposite sides are equal, and conversely.
- c) In a parallelogram opposite angles are equal, and conversely.
- d) A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.
- e) In a parallelogram, the diagonals bisect each other and conversely.
- f) In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and in half of it and (motivate) its converse.

5. CIRCLES

- a) Equal chords of a circle subtend equal angles at the center and (motivate) its converse.
- b) The perpendicular from the center of a circle to a chord bisects the chord and conversely, the line drawn through the center of a circle to bisect a chord is perpendicular to the chord.
- c) Equal chords of a circle (or of congruent circles) are equidistant from the center (or their respective centers) and conversely.
- d) The angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.
- e) Angles in the same segment of a circle are equal.
- f) If a line segment joining two points subtends equal angle at two other points lying on the same side of the line containing the segment, the four points lie on a circle.
- g) The sum of either of the pair of the opposite angles of a cyclic quadrilateral is 180°

UNIT V: MENSURATION

1. AREAS -Area of a triangle using Heron's formula (without proof)
2. SURFACE AREAS AND VOLUMES -Surface areas and volumes of spheres (including hemispheres) and right circular cones.

UNIT VI: STATISTICS STATISTICS

Bar graphs, histograms (with varying base lengths), and frequency polygons.

UNIT I: NUMBER SYSTEMS

1. REAL NUMBER

Fundamental Theorem of Arithmetic - statements after reviewing work done earlier and after illustrating and motivating through examples, Proofs of irrationality of $\sqrt{2}$ $\sqrt{3}$ $\sqrt{5}$

UNIT II: ALGEBRA

1. POLYNOMIALS

Zeros of a polynomial. Relationship between zeros and coefficients of quadratic polynomials.

2. PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Pair of linear equations in two variables and graphical method of their solution, consistency/inconsistency.

Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically - by substitution, by elimination. Simple situational problems.

3. QUADRATIC EQUATIONS

Standard form of a quadratic equation $ax^2 + bx + c = 0$, ($a \neq 0$). Solutions of quadratic equations (only real roots) by factorization, and by using quadratic formula. Relationship between discriminant and nature of roots. Situational problems based on quadratic equations related to day to day activities to be incorporated.

4. ARITHMETIC PROGRESSIONS

Motivation for studying Arithmetic Progression Derivation of the nth term and sum of the first n terms of A.P. and their application in solving daily life problems.

UNIT III: COORDINATE GEOMETRY

Coordinate Geometry

Review: Concepts of coordinate geometry, graphs of linear equations. Distance formula. Section formula (internal division)

UNIT IV: GEOMETRY

1. TRIANGLES

Definitions, examples, counter examples of similar triangles.

- a) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
- b) If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.
- c) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.
- d) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.
- e) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.

2. CIRCLES

Tangent to a circle at, point of contact

- a) The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- b)** The lengths of tangents drawn from an external point to a circle are equal.

UNIT V: TRIGONOMETRY

- a) INTRODUCTION TO TRIGONOMETRY: Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); motivate the ratios whichever are defined at 0° and 90° . Values of the trigonometric ratios of 30° , 45° and 60° . Relationships between the ratios.
- b) TRIGONOMETRIC IDENTITIES: Proof and applications of the identity $\sin^2 A + \cos^2 A = 1$. Only simple identities to be given.
- c) HEIGHTS AND DISTANCES: Angle of elevation, Angle of Depression. Simple problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only 30° , 45° , and 60°

UNIT VI: MENSURATION

1. AREAS RELATED TO CIRCLES: Area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60° , 90° and 120° only.
2. SURFACE AREAS

AND VOLUMES: Surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones.

UNIT VII: STATISTICS AND PROBABILITY

1. STATISTICS: Mean, median and mode of grouped data (bimodal situation to be avoided).
2. PROBABILITY: Classical definition of probability. Simple problems on finding the probability of an event.

SCIENCE

Chapter 1 CROP PRODUCTION AND MANAGEMENT

Chapter 2 MICROORGANISMS: FRIEND AND FOE

Chapter 3 COAL AND PETROLEUM

Chapter 4 COMBUSTION AND FLAME

Chapter 5 CONSERVATION OF PLANTS AND ANIMALS

Chapter 6 REPRODUCTION IN ANIMALS

Chapter 7 REACHING THE AGE OF ADOLESCENCE

Chapter 8 FORCE AND PRESSURE

Chapter 9 FRICTION

Chapter 11 CHEMICAL EFFECTS OF ELECTRIC CURRENT

Chapter 12 SOME NATURAL PHENOMENA

Chapter 13 LIGHT

Theme: Materials

Unit I: Matter-Nature and Behaviour

Definition of matter; solid, liquid and gas; characteristics - shape, volume, density; change of state melting (absorption of heat), freezing, evaporation (cooling by evaporation), condensation, sublimation.

Nature of matter: Elements, compounds and mixtures. Heterogeneous and homogenous mixtures, colloids and suspensions. Physical and chemical changes (excluding separating the components of a mixture).

Particle nature and their basic units: Atoms and molecules, Law of Chemical Combination, Chemical formula of common compounds, Atomic and molecular masses.

Structure of atoms: Electrons, protons and neutrons, Valency, Atomic Number and Mass Number, Isotopes and Isobars.

Theme: The World of the Living

Unit II: Organization in the Living World

Cell - Basic Unit of life : Cell as a basic unit of life; prokaryotic and eukaryotic cells, multicellular organisms; cell membrane and cell wall, cell organelles and cell inclusions; chloroplast, mitochondria, vacuoles, endoplasmic reticulum, Golgi apparatus; nucleus, chromosomes - basic structure, number.

Tissues, Organs, Organ System, Organism: Structure and functions of animal and plant tissues (only four types of tissues in animals; Meristematic and Permanent tissues in plants).

Theme: Moving Things, People and Ideas

Unit III: Motion, Force and Work

Motion: Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and uniformly accelerated motion, elementary idea of uniform circular motion.

Force and Newton's laws : Force and Motion, Newton's Laws of Motion, Action and Reaction forces, Inertia of a body, Inertia and mass, Momentum, Force and Acceleration. Gravitation:

Gravitation; Universal Law of Gravitation, Force of Gravitation of the earth (gravity), Acceleration due to Gravity; Mass and Weight; Free fall.

Floatation: Thrust and Pressure. Archimedes' Principle; Buoyancy.

Work, Energy and Power: Work done by a Force, Energy, power; Kinetic and Potential energy; Law of conservation of energy (excluding commercial unit of Energy).

Sound: Nature of sound and its propagation in various media, speed of sound, range of hearing in humans; ultrasound; reflection of sound; echo.

Theme: Food

Unit IV: Food Production

Plant and animal breeding and selection for quality improvement and management; Use of fertilizers and manures; Protection from pests and diseases; Organic farming.

Theme: Materials

Unit I: Chemical Substances - Nature and Behaviour

Chemical reactions: Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.

Acids, bases and salts: Their definitions in terms of furnishing of H^+ and OH^- ions, General properties, examples and uses, neutralization, concept of pH scale (Definition relating to logarithm not required), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.

Metals and non-metals: Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and its prevention.

Carbon compounds: Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes

and alkynes), difference between saturated hydro carbons and unsaturated hydrocarbons. Chemical properties of carbon compounds (combustion, oxidation, addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

Theme: The World of the Living

Unit II: World of Living

Life processes: 'Living Being'. Basic concept of nutrition, respiration, transport and excretion in plants and animals.

Control and co-ordination in animals and plants: Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals: Nervous system; Voluntary, involuntary and reflex action; Chemical co-ordination: animal hormones.

Reproduction: Reproduction in animals and plants (asexual and sexual) reproductive health - need and methods of family planning. Safe sex vs HIV/AIDS. Child bearing and women's health.

Heredity and Evolution: Heredity; Mendel's contribution- Laws for inheritance of traits: Sex determination: brief introduction: (topics excluded - evolution; evolution and classification and evolution should not be equated with progress).

Theme: Natural Phenomena

Unit III: Natural Phenomena

Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification. Refraction; Laws of refraction, refractive index. Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens. Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses. Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life (excluding colour of the sun at sunrise and sunset).

Theme: How Things Work

Unit IV: Effects of Current

Electric current, potential difference and electric current. Ohm's law; Resistance, Resistivity, Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R. Magnetic effects of current : Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's Left Hand Rule, Direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

Theme: Natural Resources

Unit V: Natural Resources

Our environment: Eco-system, Environmental problems, Ozone depletion, waste production and their solutions

FINANCIAL MANAGEMENT

Unit I: Financial Management goals & objectives, Functions of financial managers, Concepts of risk and return, Environment of finance in organization of finance function, Introduction to time value of money, Capital Budgeting techniques.

Unit II: Cost of Capital, Capital Structure - Theory & Practice, EBIT, EPS Analysis, Dividend decisions & policy.

Unit III: Long term financing, Working capital management - Cash, credit, Inventory Management & Financing,

Unit IV: Financial Statement Analysis, Financial planning & budgeting, Introduction to international financial management

HUMAN RESOURCE MANAGEMENT

Unit I: Nature and Concept of HRM: Human Resource Management: History. Concepts- Personnel Management, Human Resource Development and Human Resource Management, Importance of HRM and present day challenges, Understanding the present day scenario, Evolution of HRM into strategic HRM, Human Resource Planning: The process of Human Resource Planning, Limitations.

Unit II: Job Analysis: Process of Job-analysis and Design: Outcomes of Job-analysis- Job Description, Job Specification and job Evaluation. Job Design. Recruitment, Selection and Placement: Factors affecting Recruitment, Process of Recruitment, Sources of Recruitment. Process of Selection- Stages; Socialization and Induction; Promotions, Demotions, Transfers and Separations.

Unit III: Training & Development: Difference between training and development, Training Methods, Executive Development. Performance Appraisal: Methods of Performance Appraisal, Possible Errors in Appraisal Process, Planning for Performance Improvement.

Unit IV: Compensation Planning: Objective of Compensation Planning, Theories underlying Motivation and Remuneration, Developing Pay Structures, Principles of Wage and Salary Administration, Current Trends in Salary Administration. Industrial Relations & Workers Participation in Management: Theories of Industrial Relations, HRM Practices – Change in perspective, Strategic management of Industrial Relations, Collective Bargaining– Policies and Practices, Workers’ Participation in Management, Quality Circles

PROJECT MANAGEMENT

Unit I: Generation & Screening of project idea, Preliminary Screening, Project Rating Index, Entrepreneurial Skills, Market & demand analysis, Collection of Primary & Secondary information, Demand forecasting, Market planning.

Unit II: Technical Analysis, Manufacturing process / technology, Material inputs & utilities, Product Mix, Plant Capacity, Location & site, Machinery & Equipment, Structures & Civil work, Environmental aspects, Project Charts & Layouts, Project Time Lines.

Unit III: Cost of projects, Means of financing, Estimates of Sales & Production, Cost of Production, Working Capital Requirement & Financing, Projected income statement, Balance sheet and cash flow with multiyear projections, Consideration of alternative sources of finance.

Unit IV: Project Implementation: Forms of project organization, Project control & control charts, Human aspects of project management, Prerequisites for a successful project implementation, Introduction to project network & determination of critical path, Preparation of comprehensive project report.

Intellectual Property Rights Syllabus

1. General Introduction to IP Rights
2. Patent
3. Industrial design and layout design of integrated circuit and utility models
4. Trademark, Domain Names, Geographical Indication
5. Copyrights and Related rights
6. Plant Varieties protection, Biotechnology, and Traditional knowledge
7. Managements of IPR
8. Trade Secret, competition law and protection of T