

		2021		2023
Maths	Sets Relation & Function			Sets, Relations and Functions Sets and their representations, different kinds of sets (empty, finite and infinite), algebra of sets, intersection, complement, difference and symmetric difference of sets and their algebraic properties, De-Morgan's laws on union, intersection, difference (for finite number of sets) and practical problems based on them. Cartesian product of finite sets, ordered pair, relations, domain and codomain of relations, equivalence relation
		Real valued functions of a real variable, into, onto and one-to-one functions, sum, difference, product and quotient of two functions, composite functions, absolute value, polynomial, rational, trigonometric, exponential and logarithmic functions		Function as a special case of relation, functions as mappings, domain, codomain, range of functions, invertible functions, even and odd functions, into, onto and one-to-one functions, special functions (polynomial, trigonometric, exponential, logarithmic, power, absolute value, greatest integer etc.), sum, difference, product and composition of functions.
	Algebra	Algebra of complex numbers, addition, multiplication, conjugation, polar representation, properties of modulus and principal argument, triangle inequality, cube roots of unity, geometric interpretations. Quadratic equations with real coefficients, relations between roots and coefficients, formation of quadratic equations with given roots, symmetric functions of roots. Arithmetic, geometric and harmonic progressions, arithmetic, geometric and harmonic means, sums of finite arithmetic and geometric progressions, infinite geometric series, sums of squares and cubes of the first n natural numbers. Logarithms and their properties. Permutations and combinations, binomial theorem for a positive integral index, properties of binomial coefficients.		Algebra of complex numbers, addition, multiplication, conjugation, polar representation, properties of modulus and principal argument, triangle inequality, cube roots of unity, geometric interpretations. Statement of fundamental theorem of algebra , Quadratic equations with real coefficients, relations between roots and coefficients, formation of quadratic equations with given roots, symmetric functions of roots. Arithmetic and geometric progressions, arithmetic and geometric means, sums of finite arithmetic and geometric progressions, infinite geometric series, sum of the first n natural numbers , sums of squares and cubes of the first n natural numbers. Logarithms and their properties, permutations and combinations, binomial theorem for a positive integral index, properties of binomial coefficients.

		2021		2023
	Matrices	Matrices as a rectangular array of real numbers, equality of matrices, addition, multiplication by a scalar and product of matrices, transpose of a matrix, determinant of a square matrix of order up to three, inverse of a square matrix of order up to three, properties of these matrix operations, diagonal, symmetric and skew-symmetric matrices and their properties, solutions of simultaneous linear equations in two or three variables.		Matrices as a rectangular array of real numbers, equality of matrices, addition, multiplication by a scalar and product of matrices, transpose of a matrix, elementary row and column transformations , determinant of a square matrix of order up to three, adjoint of a matrix , inverse of a square matrix of order up to three, properties of these matrix operations, diagonal, symmetric and skew-symmetric matrices and their properties, solutions of simultaneous linear equations in two or three variables.
	Probability & Statistics	Addition and multiplication rules of probability, conditional probability, Bayes Theorem, independence of events, computation of probability of events using permutations and combinations.		Random experiment, sample space, different types of events (impossible, simple, compound) , addition and multiplication rules of probability, conditional probability, independence of events, total probability , Bayes Theorem, computation of probability of events using permutations and combinations.
				Measure of central tendency and dispersion, mean, median, mode, mean deviation, standard deviation and variance of grouped and ungrouped data, analysis of the frequency distribution with same mean but different variance, random variable, mean and variance of the random variable.
	Trigonometry	Trigonometric functions, their periodicity and graphs, addition and subtraction formulae, formulae involving multiple and sub-multiple angles, general solution of trigonometric equations. Relations between sides and angles of a triangle, sine rule, cosine rule, half-angle formula and the area of a triangle, inverse trigonometric functions (principal value only).		Trigonometric functions, their periodicity and graphs, addition and subtraction formulae, formulae involving multiple and sub-multiple angles, general solution of trigonometric equations. Inverse trigonometric functions (principal value only) and their elementary properties.

		2021		2023
	Analytical Geometry	<p>Two dimensions: Cartesian coordinates, distance between two points, section formulae, shift of origin. Equation of a straight line in various forms, angle between two lines, distance of a point from a line; Lines through the point of intersection of two given lines, equation of the bisector of the angle between two lines, concurrency of lines; Centroid, orthocentre, incentre and circumcentre of a triangle. Equation of a circle in various forms, equations of tangent, normal and chord. Parametric equations of a circle, intersection of a circle with a straight line or a circle, equation of a circle through the points of intersection of two circles and those of a circle and a straight line. Equations of a parabola, ellipse and hyperbola in standard form, their foci, directrices and eccentricity, parametric equations, equations of tangent and normal. Locus problems. Three dimensions: Direction cosines and direction ratios, equation of a straight line in space, equation of a plane, distance of a point from a plane.</p>		<p>Two dimensions: Cartesian coordinates, distance between two points, section formulae, shift of origin.</p>
				<p>Equation of a straight line in various forms, angle between two lines, distance of a point from a line; Lines through the point of intersection of two given lines, equation of the bisector of the angle between two lines, concurrency of lines; Centroid, orthocentre, incentre and circumcentre of a triangle. Equation of a circle in various forms, equations of tangent, normal and chord. Parametric equations of a circle, intersection of a circle with a straight line or a circle, equation of a circle through the points of intersection of two circles and those of a circle and a straight line. Equations of a parabola, ellipse and hyperbola in standard form, their foci, directrices and eccentricity, parametric equations, equations of tangent and normal. Locus problems. Three dimensions: Distance between two points, direction cosines and direction ratios, equation of a straight line in space, skew lines, shortest distance between two lines, equation of a plane, distance of a point from a plane, angle between two lines, angle between two planes, angle between a line and the plane, coplanar lines.</p>

		2021		2023
	Differential calculus	<p>Limit and continuity of a function, limit and continuity of the sum, difference, product and quotient of two functions, L'Hospital rule of evaluation of limits of functions. Even and odd functions, inverse of a function, continuity of composite functions, intermediate value property of continuous functions. Derivative of a function, derivative of the sum, difference, product and quotient of two functions, chain rule, derivatives of polynomial, rational, trigonometric, inverse trigonometric, exponential and logarithmic functions. Derivatives of implicit functions, derivatives up to order two, geometrical interpretation of the derivative, tangents and normals, increasing and decreasing functions, maximum and minimum values of a function, Rolle's theorem and Lagrange's mean value theorem.</p>		<p>Limit of a function at a real number, continuity of a function, limit and continuity of the sum, difference, product and quotient of two functions, L'Hospital rule of evaluation of limits of functions. Continuity of composite functions, intermediate value property of continuous functions. Derivative of a function, derivative of the sum, difference, product and quotient of two functions, chain rule, derivatives of polynomial, rational, trigonometric, inverse trigonometric, exponential and logarithmic functions. Tangents and normals, increasing and decreasing functions, derivatives of order two, maximum and minimum values of a function, Rolle's theorem and Lagrange's mean value theorem, geometric interpretation of the two theorems, derivatives up to order two of implicit functions, geometric interpretation of derivatives.</p>
	Integral Calculus	<p>Integration as the inverse process of differentiation, indefinite integrals of standard functions, definite integrals and their properties, fundamental theorem of integral calculus. Integration by parts, integration by the methods of substitution and partial fractions, application of definite integrals to the determination of areas involving simple curves. Formation of ordinary differential equations, solution of homogeneous differential equations, separation of variables method, linear first order differential equations.</p>		<p>Integration as the inverse process of differentiation, indefinite integrals of standard functions, definite integrals as the limit of sums, definite integral and their properties, fundamental theorem of integral calculus. Integration by parts, integration by the methods of substitution and partial fractions, application of definite integrals to the determination of areas bounded by simple curves. Formation of ordinary differential equations, solution of homogeneous differential equations of first order and first degree, separation of variables method, linear first order differential equations.</p>
	Vector	<p>Addition of vectors, scalar multiplication, dot and cross products, scalar triple products and their geometrical interpretations.</p>		<p>Addition of vectors, scalar multiplication, dot and cross products, scalar and vector triple products, and their geometrical interpretations.</p>

		2021		2023
Physics	General	<p>Units and dimensions, dimensional analysis; least count, significant figures; Methods of measurement and error analysis for physical quantities pertaining to the following experiments: Experiments based on using Vernier calipers and screw gauge (micrometer), Determination of g using simple pendulum, Young's modulus by Searle's method, Specific heat of a liquid using calorimeter, focal length of a concave mirror and a convex lens using u-v method, Speed of sound using resonance column, Verification of Ohm's law using voltmeter and ammeter, and specific resistance of the material of a wire using meter bridge and post office box.</p>		<p>General Units and dimensions, dimensional analysis; least count, significant figures; Methods of measurement and error analysis for physical quantities pertaining to the following experiments: Experiments based on using Vernier calipers and screw gauge (micrometer), Determination of g using simple pendulum, Young's modulus - elasticity of the material Surface tension of water by capillary rise and effect of detergents. Specific heat of a liquid using calorimeter, focal length of a concave mirror and a convex lens using u-v method, Speed of sound using resonance column, Verification of Ohm's law using voltmeter and ammeter, and specific resistance of the material of a wire using meter bridge and post office box.</p>

		2021		2023
	Mechanics	<p>Kinematics in one and two dimensions (Cartesian coordinates only), projectiles; Uniform circular motion; Relative velocity. Newton's laws of motion; Inertial and uniformly accelerated frames of reference; Static and dynamic friction; Kinetic and potential energy; Work and power; Conservation of linear momentum and mechanical energy. Systems of particles; Centre of mass and its motion; Impulse; Elastic and inelastic collisions. Law of gravitation; Gravitational potential and field; Acceleration due to gravity; Motion of planets and satellites in circular orbits; Escape velocity. Rigid body, moment of inertia, parallel and perpendicular axes theorems, moment of inertia of uniform bodies with simple geometrical shapes; Angular momentum; Torque; Conservation of angular momentum; Dynamics of rigid bodies with fixed axis of rotation; Rolling without slipping of rings, cylinders and spheres; Equilibrium of rigid bodies; Collision of point masses with rigid bodies. Linear and angular simple harmonic motions. Hooke's law, Young's modulus. Pressure in a fluid; Pascal's law; Buoyancy; Surface energy and surface tension, capillary rise; Viscosity (Poiseuille's equation excluded), Stoke's law; Terminal velocity, Streamline flow, equation of continuity, Bernoulli's theorem and its applications. Wave motion (plane waves only), longitudinal and transverse waves, superposition of waves; Progressive and stationary waves; Vibration of strings and air columns; Resonance; Beats; Speed of sound in gases; Doppler effect (in sound).</p>		<p>Kinematics in one and two dimensions (Cartesian coordinates only), projectiles; Uniform circular motion; Relative velocity. Newton's laws of motion; Inertial and uniformly accelerated frames of reference; Static and dynamic friction; Kinetic and potential energy; Work and power; Conservation of linear momentum and mechanical energy. Systems of particles; Centre of mass and its motion; Impulse; Elastic and inelastic collisions. Rigid body, moment of inertia, parallel and perpendicular axes theorems, moment of inertia of uniform bodies with simple geometrical shapes; Angular momentum; Torque; Conservation of angular momentum; Dynamics of rigid bodies with fixed axis of rotation; Rolling without slipping of rings, cylinders and spheres; Equilibrium of rigid bodies; Collision of point masses with rigid bodies. Forced and damped oscillation (in one dimension), resonance. Linear and angular simple harmonic motions. Hooke's law, Young's modulus. Law of gravitation; Gravitational potential and field; Acceleration due to gravity; Kepler's law, Geostationary orbits, Motion of planets and satellites in circular orbits; Escape velocity. Pressure in a fluid; Pascal's law; Buoyancy; Surface energy and surface tension, angle of contact, drops, bubbles and capillary rise. Viscosity (Poiseuille's equation excluded), Modulus of rigidity and bulk modulus in mechanics. Stoke's law; Terminal velocity, Streamline flow, equation of continuity, Bernoulli's theorem and its applications. Wave motion (plane waves only), longitudinal and transverse waves, superposition of waves; Progressive and stationary waves; Vibration of strings and air columns; Resonance; Beats; Speed of sound in gases; Doppler effect (in sound)</p>

		2021		2023
	Thermal Physics	<p>Thermal expansion of solids, liquids and gases; Calorimetry, latent heat; Heat conduction in one dimension; Elementary concepts of convection and radiation; Newton's law of cooling; Ideal gas laws; Specific heats (C_v and C_p for monoatomic and diatomic gases); Isothermal and adiabatic processes, bulk modulus of gases; Equivalence of heat and work; First law of thermodynamics and its applications (only for ideal gases); Blackbody radiation: absorptive and emissive powers; Kirchhoff's law; Wien's displacement law, Stefan's law.</p>		<p>Thermal expansion of solids, liquids and gases; Calorimetry, latent heat; Heat conduction in one dimension; Elementary concepts of convection and radiation; Newton's law of cooling; Ideal gas laws; Specific heats (C_v and C_p for monoatomic and diatomic gases); Isothermal and adiabatic processes, bulk modulus of gases; Equivalence of heat and work; First law of thermodynamics and its applications (only for ideal gases); Second law of thermodynamics, reversible and irreversible processes, Carnot engine and its efficiency; Blackbody radiation: absorptive and emissive powers; Kirchhoff's law; Wien's displacement law, Stefan's law.</p>
	Electricity & Magnetism	<p>Coulomb's law; Electric field and potential; Electrical potential energy of a system of point charges and of electrical dipoles in a uniform electrostatic field; Electric field lines; Flux of electric field; Gauss's law and its application in simple cases, such as, to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell. Capacitance; Parallel plate capacitor with and without dielectrics; Capacitors in series and parallel; Energy stored in a capacitor. Electric current; Ohm's law; Series and parallel arrangements of resistances and cells; Kirchhoff's laws and simple applications; Heating effect of current. Biot-Savart's law and Ampere's law; Magnetic field near a current-carrying straight wire, along the axis of a circular coil and inside a long straight solenoid; Force on a moving charge and on a current-carrying wire in a uniform magnetic field. Magnetic moment of a current loop; Effect of a uniform magnetic field on a current loop; Moving coil galvanometer, voltmeter, ammeter and their conversions. Electromagnetic induction: Faraday's law, Lenz's law; Self and mutual inductance; RC, LR and LC circuits with d.c. and a.c. sources.</p>		<p>Coulomb's law; Electric field and potential; Electrical potential energy of a system of point charges and of electrical dipoles in a uniform electrostatic field; Electric field lines; Flux of electric field; Gauss's law and its application in simple cases, such as, to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell. Capacitance; Parallel plate capacitor with and without dielectrics; Capacitors in series and parallel; Energy stored in a capacitor. Electric current; Ohm's law; Series and parallel arrangements of resistances and cells; Kirchhoff's laws and simple applications; Heating effect of current. Biot-Savart's law and Ampere's law; Magnetic field near a current-carrying straight wire, along the axis of a circular coil and inside a long straight solenoid; Force on a moving charge and on a current-carrying wire in a uniform magnetic field. Magnetic moment of a current loop; Effect of a uniform magnetic field on a current loop; Moving coil galvanometer, voltmeter, ammeter and their conversions. Electromagnetic induction: Faraday's law, Lenz's law; Self and mutual inductance; RC, LR, LC and LCR(in series) circuits with d.c. and a.c. sources.</p>

		2021		2023
	EM waves			Electromagnetic waves and their characteristics. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays) including elementary facts about their uses.
	Optics	Rectilinear propagation of light; Reflection and refraction at plane and spherical surfaces; Total internal reflection; Deviation and dispersion of light by a prism; Thin lenses; Combinations of mirrors and thin lenses; Magnification. Wave nature of light: Huygen's principle, interference limited to Young's double-slit experiment.		Rectilinear propagation of light; Reflection and refraction at plane and spherical surfaces; Total internal reflection; Deviation and dispersion of light by a prism; Thin lenses; Combinations of mirrors and thin lenses; Magnification. Wave nature of light: Huygen's principle, interference limited to Young's double slit experiment. Diffraction due to a single slit. Polarization of light, plane polarized light; Brewster's law, Polaroids.
	Modern Physics	Atomic nucleus; α , β and γ radiations; Law of radioactive decay; Decay constant; Half-life and mean life; Binding energy and its calculation; Fission and fusion processes; Energy calculation in these processes. Photoelectric effect; Bohr's theory of hydrogen-like atoms; Characteristic and continuous X-rays, Moseley's law; de Broglie wavelength of matter waves.		Atomic nucleus; α , β and γ radiations; Law of radioactive decay; Decay constant; Half-life and mean life; Binding energy and its calculation; Fission and fusion processes; Energy calculation in these processes. Photoelectric effect; Bohr's theory of hydrogen-like atoms; Characteristic and continuous X-rays, Moseley's law; de Broglie wavelength of matter waves.
Chemistry	Gen Topics	Concept of atoms and molecules; Dalton's atomic theory; Mole concept; Chemical formulae; Balanced chemical equations; Calculations (based on mole concept) involving common oxidation-reduction, neutralisation, and displacement reactions; Concentration in terms of mole fraction, molarity, molality and normality.		Concept of atoms and molecules; Dalton's atomic theory; Mole concept; Chemical formulae; Balanced chemical equations; Calculations (based on mole concept and stoichiometry) involving common oxidation-reduction, neutralisation, and displacement reactions; Concentration in terms of mole fraction, molarity, molality and normality.

		2021		2023
	Gaseous & Liquid State	Absolute scale of temperature, ideal gas equation; Deviation from ideality, van der Waals equation; Kinetic theory of gases, average, root mean square and most probable velocities and their relation with temperature; Law of partial pressures; Vapour pressure; Diffusion of gases.		Gas laws and ideal gas equation, absolute scale of temperature; Deviation from ideality, van der Waals equation; Kinetic theory of gases, average, root mean square and most probable velocities and their relation with temperature; Law of partial pressures; Diffusion of gases. Intermolecular interactions: types, distance dependence, and their effect on properties; Liquids: vapour pressure, surface tension, viscosity.
	Atomic Structure & Chemical Bonding	Bohr model, spectrum of hydrogen atom, quantum numbers; Wave-particle duality, de Broglie hypothesis; Uncertainty principle; Qualitative quantum mechanical picture of hydrogen atom, shapes of s, p and d orbitals; Electronic configurations of elements (up to atomic number 36) ; Aufbau principle; Pauli's exclusion principle and Hund's rule; Orbital overlap and covalent bond; Hybridisation involving s, p and d orbitals only; Orbital energy diagrams for homonuclear diatomic species; Hydrogen bond; Polarity in molecules, dipole moment (qualitative aspects only); VSEPR model and shapes of molecules (linear, angular, triangular, square planar, pyramidal, square pyramidal, trigonal bipyramidal, tetrahedral and octahedral).		Bohr model, spectrum of hydrogen atom; Wave-particle duality, de Broglie hypothesis; Uncertainty principle; Qualitative quantum mechanical picture of hydrogen atom: Energies, quantum numbers, wave function and probability density (plots only) , shapes of s, p and d orbitals; Aufbau principle; Pauli's exclusion principle and Hund's rule. Orbital overlap and covalent bond; Hybridisation involving s, p and d orbitals only; Molecular orbital energy diagrams for homonuclear diatomic species (up to Ne₂); Hydrogen bond; Polarity in molecules, dipole moment; VSEPR model and shapes of molecules (linear, angular, triangular, square planar, pyramidal, square pyramidal, trigonal bipyramidal, tetrahedral and octahedral).
	Chemical Thermodynamics (Energetics)	First law of thermodynamics; Internal energy, work and heat, pressure-volume work; Enthalpy, Hess's law; Heat of reaction, fusion and vapourization; Second law of thermodynamics; Entropy; Free energy; Criterion of spontaneity.		Intensive and extensive properties, state functions , First law of thermodynamics; Internal energy, work (pressure-volume only) and heat; Enthalpy, heat capacity, standard state , Hess's law; Enthalpy of reaction, fusion and vapourization, and lattice enthalpy ; Second law of thermodynamics; Entropy; Gibbs energy; Criteria of equilibrium and spontaneity.

		2021		2023
	Chemical & Ionic Equilibrium	Law of mass action; Equilibrium constant, Le Chatelier's principle (effect of concentration, temperature and pressure); Significance of ΔG and ΔG^0 in chemical equilibrium; Solubility product, common ion effect, pH and buffer solutions; Acids and bases (Bronsted and Lewis concepts); Hydrolysis of salts.		Law of mass action; Significance of ΔG and ΔG^0 in chemical equilibrium; Equilibrium constant (K_p and K_c) and reaction quotient , Le Chatelier's principle (effect of concentration, temperature and pressure); Solubility product and its applications , common ion effect, pH and buffer solutions; Acids and bases (Bronsted and Lewis concepts); Hydrolysis of salts.
	Electrochemistry	Electrochemical cells and cell reactions; Standard electrode potentials; Nernst equation and its relation to ΔG ; Electrochemical series, emf of galvanic cells; Faraday's laws of electrolysis; Electrolytic conductance, specific, equivalent and molar conductivity, Kohlrausch's law; Concentration cells.		Electrochemical cells and cell reactions; Standard electrode potentials; Electrochemical work , Nernst equation; Electrochemical series, emf of galvanic cells; Faraday's laws of electrolysis; Electrolytic conductance, specific, equivalent and molar conductivity, Kohlrausch's law; Batteries: Primary and Secondary, fuel cells; Corrosion.
	Chemical Kinetics	Rates of chemical reactions; Order of reactions; Rate constant; First order reactions; Temperature dependence of rate constant (Arrhenius equation).		Rates of chemical reactions; Order and molecularity of reactions ; Rate law , rate constant, half-life; Differential and integrated rate expressions for zero and first order reactions; Temperature dependence of rate constant (Arrhenius equation and activation energy); Catalysis: Homogeneous and heterogeneous, activity and selectivity of solid catalysts, enzyme catalysis and its mechanism.
	Solid State	Classification of solids, crystalline state, seven crystal systems (cell parameters a, b, c, α , β , γ), close packed structure of solids (cubic), packing in fcc, bcc and hcp lattices; Nearest neighbours, ionic radii, simple ionic compounds, point defects.		Classification of solids, crystalline state, seven crystal systems (cell parameters a, b, c, α , β , γ), close packed structure of solids (cubic and hexagonal), packing in fcc, bcc and hcp lattices; Nearest neighbours, ionic radii and radius ratio, point defects.
	Solution	Raoult's law; Molecular weight determination from lowering of vapour pressure, elevation of boiling point and depression of freezing point.		Henry's law; Raoult's law; Ideal solutions; Colligative properties: lowering of vapour pressure, elevation of boiling point, depression of freezing point, and osmotic pressure; van't Hoff factor.

		2021		2023
	Surface Chemistry	Elementary concepts of adsorption (excluding adsorption isotherms); Colloids: types, methods of preparation and general properties; Elementary ideas of emulsions, surfactants and micelles (only definitions and examples).		Elementary concepts of adsorption: Physisorption and Chemisorption, Freundlich adsorption isotherm ; Colloids: types, methods of preparation and general properties; Elementary ideas of emulsions, surfactants and micelles (only definitions and examples).
	Nuclear Chemistry	Radioactivity: isotopes and isobars; Properties of α , β and γ rays; Kinetics of radioactive decay (decay series excluded), carbon dating; Stability of nuclei with respect to proton-neutron ratio; Brief discussion on fission and fusion reactions.		No longer mentioned in syllabus
		Earlier not mentioned in the syllabus	Classification of Elements and Periodicity in Properties	Modern periodic law and the present form of periodic table; electronic configuration of elements; periodic trends in atomic radius, ionic radius, ionization enthalpy, electron gain enthalpy, valence, oxidation states, electronegativity, and chemical reactivity.
		Earlier not mentioned in the syllabus	Hydrogen	Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen; hydrides – ionic, covalent and interstitial; physical and chemical properties of water, physical and chemical properties of heavy water; hydrogen peroxide-preparation, reactions, use and structure; hydrogen as a fuel.

		2021		2023
	Preparation and properties of the following compounds: (s block)	Oxides, peroxides, hydroxides, carbonates, bicarbonates, chlorides and sulphates of sodium, potassium, magnesium and calcium;	s-block element	<p>Alkali and alkaline earth metals-reactivity towards air, water, dihydrogen, halogens, acids;</p> <p>their reducing nature including solutions in liquid ammonia;</p> <p>uses of these elements;</p> <p>general characteristics of their oxides, hydroxides, halides, salts of oxoacids;</p> <p>anomalous behaviour of lithium and beryllium;</p> <p>preparation, properties, and uses of compounds of sodium (sodium carbonate, sodium chloride, sodium hydroxide, sodium hydrogen carbonate) and calcium (calcium oxide, calcium hydroxide, calcium carbonate, calcium sulphate).</p>
	Preparation and properties of the following compounds & Non Metal: (p block)	Boron, silicon, nitrogen, phosphorus, oxygen, sulphur and halogens	p-block	Oxidation state and trends in chemical reactivity of elements of groups 13-17; anomalous properties of boron, carbon, nitrogen, oxygen, and fluorine with respect to other elements in their respective groups.
		<p>Boron: diborane, boric acid and borax;</p> <p>Aluminium: alumina, aluminium chloride and alums;</p>		Group 13: Reactivity towards acids, alkalis, and halogens; preparation, properties, and uses of borax, orthoboric acid, diborane, boron trifluoride, aluminium chloride, and alums; uses of boron and aluminium.
		<p>Carbon: oxides and oxyacid (carbonic acid); Properties of allotropes of carbon (only diamond and graphite)</p> <p>Silicon: silicones, silicates and silicon carbide;</p> <p>Oxides and chlorides of tin and lead;</p>		Group 14: Reactivity towards water and halogen; allotropes of carbon and uses of carbon; preparation, properties, and uses of carbon monoxide, carbon dioxide, silicon dioxide, silicones, silicates, zeolites.

	2021		2023
	<p>Nitrogen: oxides, oxyacids and ammonia;</p> <p>Phosphorus: oxides, oxyacids (phosphorus acid, phosphoric acid) and phosphine; Properties of allotropes of Phosphorus</p>		<p>Group 15: Reactivity towards hydrogen, oxygen, and halogen; allotropes of phosphorous; preparation, properties, and uses of dinitrogen, ammonia, nitric acid, phosphine, phosphorus trichloride, phosphorus pentachloride; oxides of nitrogen and oxoacids of phosphorus.</p>
	<p>Oxygen: ozone and hydrogen peroxide</p> <p>Sulphur: hydrogen sulphide, oxides, sulphurous acid, sulphuric acid and sodium thiosulphate; Properties of allotropes of Sulphur</p>		<p>Group 16: Reactivity towards hydrogen, oxygen, and halogen; simple oxides; allotropes of sulfur; preparation/manufacture, properties, and uses of dioxygen, ozone, sulfur dioxide, sulfuric acid; oxoacids of sulfur.</p>
	<p>Halogens: hydrohalic acids, oxides and oxyacids of chlorine, bleaching powder;</p>		<p>Group 17: Reactivity towards hydrogen, oxygen, and metals; preparation/manufacture, properties, and uses of chlorine, hydrogen chloride and interhalogen compounds; oxoacids of halogens, bleaching powder.</p>
	<p>Xenon fluorides</p>		<p>Group 18: Chemical properties and uses; compounds of xenon with fluorine and oxygen.</p>
	<p>Preparation and properties of the Oxides, chlorides and sulphates of Fe²⁺, Cu²⁺ and Zn²⁺;</p> <p>Preparation and properties of the Potassium permanganate, potassium dichromate, silver oxide, silver nitrate, silver thiosulphate.</p>	d-block elements	<p>Oxidation states and their stability; standard electrode potentials; interstitial compounds; alloys; catalytic properties; applications; preparation, structure, and reactions of oxoanions of chromium and manganese.</p>
	<p>Earlier not mentioned in the syllabus</p>	f-block elements	<p>Lanthanoid and actinoid contractions; oxidation states; general characteristics.</p>
Principles of Qualitative Analysis	<p>Groups I to V (only Ag⁺, Hg²⁺, Cu²⁺, Pb²⁺, Bi³⁺, Fe³⁺, Cr³⁺, Al³⁺, Ca²⁺, Ba²⁺, Zn²⁺, Mn²⁺ and Mg²⁺); Nitrate, halides (excluding fluoride), sulphate and sulphide.</p>	Principles of Qualitative Analysis	<p>Groups I to V (only Ag⁺, Hg²⁺, Cu²⁺, Pb²⁺, Fe³⁺, Cr³⁺, Al³⁺, Ca²⁺, Ba²⁺, Zn²⁺, Mn²⁺ and Mg²⁺); Nitrate, halides (excluding fluoride), carbonate and bicarbonate, sulphate and sulphide.</p>

		2021		2023
	Ores & Mineral	Commonly occurring ores and minerals of iron, copper, tin, lead, magnesium, aluminium, zinc and silver.	Isolation of Metals	Metal ores and their concentration; extraction of crude metal from concentrated ores: thermodynamic (iron, copper, zinc) and electrochemical (aluminium) principles of metallurgy; cyanide process (silver and gold); refining.
	Extractive Metallurgy	Chemical principles and reactions only (industrial details excluded); Carbon reduction method (iron and tin); Self reduction method (copper and lead); Electrolytic reduction method (magnesium and aluminium); Cyanide process (silver and gold).		
	Transition Element (3-D Series)	Definition, general characteristics, oxidation states and their stabilities, colour (excluding the details of electronic transitions) and calculation of spin-only magnetic moment;		
	Transition Element (3-D Series)	Coordination compounds: nomenclature of mononuclear coordination compounds, cis-trans and ionisation isomerisms, hybridization and geometries of mononuclear coordination compounds (linear, tetrahedral, square planar and octahedral).	Coordination Compound	Werner's theory; Nomenclature, cis-trans and ionization isomerism, hybridization and geometries (linear, tetrahedral, square planar and octahedral) of mononuclear coordination compounds; Bonding [VBT and CFT (octahedral and tetrahedral fields)]; Magnetic properties (spin-only) and colour of 3d-series coordination compounds; Ligands and spectrochemical series; Stability; Importance and applications; Metal carbonyls.
		Earlier not mentioned in the syllabus	Environmental Chemistry	Atmospheric pollution; water pollution; soil pollution; industrial waste; strategies to control environmental pollution; green chemistry.

	2021		2023
Concepts In Organic	Hybridisation of carbon; σ and π -bonds; Shapes of simple organic molecules; Structural and geometrical isomerism; Optical isomerism of compounds containing up to two asymmetric centres, (R,S and E,Z nomenclature excluded); IUPAC nomenclature of simple organic compounds (only hydrocarbons, mono-functional and bi-functional compounds); Conformations of ethane and butane (Newman projections); Resonance and hyperconjugation; Keto-enol tautomerism; Determination of empirical and molecular formulae of simple compounds (only combustion method); Hydrogen bonds: definition and their effects on physical properties of alcohols and carboxylic acids; Inductive and resonance effects on acidity and basicity of organic acids and bases; Polarity and inductive effects in alkyl halides; Reactive intermediates produced during homolytic and heterolytic bond cleavage; Formation, structure and stability of carbocations, carbanions and free radicals.		Hybridisation of carbon; σ and π -bonds; Shapes of simple organic molecules; aromaticity; Structural and geometrical isomerism; Stereoisomers and stereochemical relationship (enantiomers, diastereomers, meso) of compounds containing only up to two asymmetric centres, (R,S and E,Z configurations excluded); Determination of empirical and molecular formulae of simple compounds by combustion method only; IUPAC nomenclature of organic molecules (hydrocarbons, including simple cyclic hydrocarbons and their mono-functional and bi-functional derivatives only); Hydrogen bonding effects; Inductive, Resonance and Hyperconjugative effects; Acidity and basicity of organic compounds; Reactive intermediates produced during homolytic and heterolytic bond cleavage; Formation, structure and stability of carbocations, carbanions and free radicals.
Preparation, properties and reactions of alkanes	Homologous series, physical properties of alkanes (melting points, boiling points and density); Combustion and halogenation of alkanes; Preparation of alkanes by Wurtz reaction and decarboxylation reactions.	Alkanes	Homologous series; Physical properties (melting points, boiling points and density) and effect of branching on them; Conformations of ethane and butane (Newman projections only); Preparation from alkyl halides and aliphatic carboxylic acids; Reactions: combustion, halogenation (including allylic and benzylic halogenation) and oxidation.
Preparation, properties and reactions of alkenes and alkynes	Physical properties of alkenes and alkynes (boiling points, density and dipole moments); Acidity of alkynes; Acid catalysed hydration of alkenes and alkynes (excluding the stereochemistry of addition and elimination); Reactions of alkenes with KMnO_4 and ozone; Reduction of alkenes and alkynes; Preparation of alkenes and alkynes by elimination reactions; Electrophilic addition reactions of alkenes with X_2 , HX , HOX and H_2O ($\text{X}=\text{halogen}$); Addition reactions of alkynes; Metal acetylides.	Alkenes & Alkynes	Physical properties (boiling points, density and dipole moments); Preparation by elimination reactions; Acid catalysed hydration (excluding the stereochemistry of addition and elimination); Metal acetylides; Reactions of alkenes with KMnO_4 and ozone; Reduction of alkenes and alkynes; Electrophilic addition reactions of alkenes with X_2, HX, HOX, ($\text{X}=\text{halogen}$); Effect of peroxide on addition reactions; cyclic polymerization reaction of alkynes.

		2021		2023
	Reactions of benzene	Structure and aromaticity; Electrophilic substitution reactions: halogenation, nitration, sulphonation, Friedel-Crafts alkylation and acylation; Effect of o-, m- and p-directing groups in monosubstituted benzenes.	Benzene	Structure; Electrophilic substitution reactions: halogenation, nitration, sulphonation, FriedelCrafts alkylation and acylation; Effect of directing groups (monosubstituted benzene) in these reactions.
	Phenols	Acidity , electrophilic substitution reactions (halogenation, nitration and sulphonation); Reimer-Tieman reaction, Kolbe reaction.	Phenols	Physical properties; Preparation , Electrophilic substitution reactions of phenol (halogenation, nitration, sulphonation); Reimer-Tiemann reaction, Kolbe reaction; Esterification; Etherification; Aspirin synthesis; Oxidation and reduction reactions of phenol.
	Carbohydrates	Classification; mono- and di-saccharides (glucose and sucrose); Oxidation, reduction, glycoside formation and hydrolysis of sucrose.	Bimolecules	Carbohydrates: Classification; Mono- and di-saccharides (glucose and sucrose); Oxidation; Reduction; Glycoside formation and hydrolysis of disaccharides (sucrose, maltose, lactose); Anomers.
	Amino acids and peptides	General structure (only primary structure for peptides) and physical properties.	Amino acids; Peptide linkage;	Structure of peptides (primary and secondary); Types of proteins (fibrous and globular). Nucleic acids: Chemical composition and structure of DNA and RNA.
		Earlier not mentioned in the syllabus	Chemistry in Everyday life	Drug-target interaction; Therapeutic action, and examples (excluding structures), of antacids, antihistamines, tranquilizers, analgesics, antimicrobials, and antifertility drugs; Artificial sweeteners (names only); Soaps, detergents, and cleansing action.
	Properties and uses of some important polymers	Natural rubber, cellulose, nylon, teflon and PVC.	Polymers	Types of polymerization (addition, condensation); Homo and copolymers; Natural rubber; Cellulose; Nylon; Teflon; Bakelite; PVC; Bio-degradable polymers; Applications of polymers.

	2021		2023
Practical organic chemistry	Detection of elements (N, S, halogens); Detection and identification of the following functional groups: hydroxyl (alcoholic and phenolic), carbonyl (aldehyde and ketone), carboxyl, amino and nitro; Chemical methods of separation of mono-functional organic compounds from binary mixtures.	Practical Organic Chemistry	Detection of elements (N, S, halogens); Detection and identification of the following functional groups: hydroxyl (alcoholic and phenolic), carbonyl (aldehyde and ketone), carboxyl, amino and nitro.
Characteristic reactions of the following	Alkyl halides: rearrangement reactions of alkyl carbocation, Grignard reactions, nucleophilic substitution reactions	Alkyl Halides	Rearrangement reactions of alkyl carbocation; Grignard reactions; Nucleophilic substitution reactions and their stereochemical aspects.
	Alcohols: esterification, dehydration and oxidation, reaction with sodium, phosphorus halides, ZnCl ₂ /concentrated HCl, conversion of alcohols into aldehydes and ketones	Alcohols	Physical properties ; Reactions: esterification, dehydration (formation of alkenes and ethers) ; Reactions with: sodium, phosphorus halides, ZnCl ₂ /concentrated HCl, thionyl chloride ; Conversion of alcohols into aldehydes, ketones and carboxylic acids.
	Ethers: Preparation by Williamson's Synthesis	Ethers	Preparation by Williamson's synthesis; C-O bond cleavage reactions.
	Aldehydes and Ketones: oxidation, reduction, oxime and hydrazone formation; aldolcondensation, Perkin reaction ; Cannizzaro reaction; haloform reaction and nucleophilic addition reactions (Grignard addition)	Aldehyde & Ketone	Preparation of: aldehydes and ketones from acid chlorides and nitriles; aldehydes from esters; benzaldehyde from toluene and benzene ; Reactions: oxidation, reduction, oxime and hydrazone formation; Aldol condensation, Cannizzaro reaction; Haloform reaction; Nucleophilic addition reaction with RMgX, NaHSO₃, HCN, alcohol, amine
	Carboxylic acids: formation of esters, acid chlorides and amides, ester hydrolysis	Carboxylic Acids	Physical properties ; Preparation: from nitriles, Grignard reagents, hydrolysis of esters and amides ; Preparation of benzoic acid from alkylbenzenes ; reduction, halogenation, formation of esters, acid chlorides and amides.

		2021		2023
		Haloarenes: nucleophilic aromatic substitution in haloarenes and substituted haloarenes (excluding Benzyne mechanism and Cine substitution)	Haloarenes	Reactions: Fittig, Wurtz-Fittig ; Nucleophilic aromatic substitution in haloarenes and substituted haloarenes (excluding benzyne mechanism and cine substitution).
	Characteristic reactions of the following	Amines: basicity of substituted anilines and aliphatic amines , preparation from nitro compounds, reaction with nitrous acid, azo coupling reaction of diazonium salts of aromatic amines, Sandmeyer and related reactions of diazonium salts; carbylamine reaction	Amines	Preparation from nitro compounds, nitriles and amides ; Reactions: Hoffmann bromamide degradation, Gabriel phthalimide synthesis ; Reaction with nitrous acid, Azo coupling reaction of diazonium salts of aromatic amines; Sandmeyer and related reactions of diazonium salts; Carbylamine reaction, Hinsberg test, Alkylation and acylation reactions.