

WBJEE Chemistry Syllabus

WBJEE Physical Chemistry Syllabus 2027

The WBJEE 2027 Physical Chemistry topics are **Classification of Elements and Periodicity in Properties, Chemical Thermodynamics, States of Matter – Solids and Gases, and many more.**

Topics	Sub-Topics
Some Basic Concepts of Chemistry	Laws of chemical combination; concept of elements, atoms and molecules; atomic and molecular masses; mole concept and molar mass; percentage composition; empirical formula; molecular formula; chemical reactions; stoichiometry; calculations based on stoichiometry; different concentration terms of solutions and related calculations.
Structure of an Atom	Bohr's model and its limitations; shells and subshells; dual nature of matter and light; de Broglie relationship; Heisenberg uncertainty principle; Schrödinger wave equation (elementary idea only); concept of orbitals; quantum numbers; shapes of s, p and d orbitals; rules for filling electrons; Aufbau principle; Pauli's exclusion principle; Hund's rule; exchange energy; electronic configuration; stability of half-filled and filled orbitals.
Classification of Elements and Periodicity in Properties	Modern periodic law; present form of periodic table; periodic trends in atomic radii, ionic radii, van der Waals' radii, ionisation enthalpy, electron gain enthalpy, electronegativity and valency; nomenclature of elements with atomic number greater than 100.
Chemical Bonding and Molecular Structure	Valence electrons; ionic bond; bond parameters; covalent bond; Lewis structures; formal charge; polar character of covalent bonds; covalent character of ionic bonds; valence bond theory; resonance; geometry of covalent molecules; VSEPR theory; hybridisation involving s, p and d orbitals; shapes of simple molecules; intermolecular interactions; dipolar interactions; London dispersion forces; van der Waals interactions; intra- and intermolecular hydrogen bonding; molecular orbital theory of homonuclear diatomic molecules.
States of Matter – Solids and Gases	Classification of solids: molecular, ionic, covalent and metallic solids; amorphous and crystalline solids; unit cells in 2D and 3D lattices; packing efficiency; calculation of density of unit cell; packing in solids; voids; number of atoms per unit cell in cubic unit cells; point defects; kinetic theory of gases; molecular speeds; Dalton's law of partial pressure; Graham's law; deviation from ideal behaviour; van der Waals' equation; liquefaction of gases; critical parameters.
Chemical Thermodynamics	Concepts of system and surroundings; types of systems; work; heat; energy; extensive and intensive properties; state functions; Zeroth law of thermodynamics; definition of temperature; first law; internal energy change; enthalpy change; enthalpy of bond dissociation, combustion, formation, atomisation, ionisation, solution and sublimation; transformation of state; Hess's law; Born-Haber cycle and applications; second law; entropy as a state function; Gibbs free-energy change; spontaneous and non-spontaneous processes; criteria for equilibrium.
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; ionisation of acids and bases; strong and weak electrolytes; degree of ionisation of polybasic acids; acid strength; pH; Henderson equation; hydrolysis of salts; buffer solutions; buffer action; solubility product; common-ion effect.
Solutions	Introduction to solutions; solubility of gases in liquids; solid solutions; vapour pressure; Raoult's law; colligative properties; relative lowering of vapour pressure; elevation of boiling point; depression of

	freezing point; osmotic pressure; determination of molecular mass using colligative properties; abnormal molecular mass; van't Hoff factor; calculations involving van't Hoff factor; colloidal solution; true solutions; colloids; suspensions.
Chemical Kinetics	Rate of reaction — average and instantaneous; factors affecting reaction rate: concentration, temperature and catalyst; order and molecularity; rate law; specific rate constant; integrated rate equations; half-life for zero- and first-order reactions; Arrhenius equation; activation energy; collision theory (elementary idea, no mathematical treatment); catalysis; homogeneous and heterogeneous catalysis; enzyme catalysis.
Redox Reactions	Concept of oxidation and reduction; redox reactions; oxidation number; balancing redox reactions using loss and gain of electrons; balancing by change in oxidation number; applications of redox reactions in permanganometry and dichromatometry.
Electrochemistry	Conductance in electrolytic solutions; specific and molar conductivity; variation of conductivity with concentration; Kohlrausch's law; electrolysis; laws of electrolysis; dry cell; electrolytic cells; galvanic cells; EMF of a cell; standard electrode potential; Nernst equation and its application to chemical cells; relation between Gibbs free-energy change and cell EMF; fuel cells; Li-ion battery.

WBJEE Organic Chemistry Syllabus 2027

The WBJEE Organic Chemistry topics include **Hydrocarbons, Alcohols, Phenols and Ethers, Cyanides and Isocyanides, and many more.**

Topics	Sub-Topics
Some Basic Principles	General introduction; classification of organic compounds; IUPAC nomenclature; electronic displacement in covalent bonds; inductive effect; resonance; hyperconjugation; homolytic and heterolytic fission; free radicals; carbocations; carbanions; electrophiles; nucleophiles; elementary idea of addition, elimination and substitution reactions.
Hydrocarbons	Classification of hydrocarbons. Alkanes: nomenclature, isomerism, conformations of ethane, physical properties up to 6 carbons, halogenation, free-radical mechanism, combustion and pyrolysis. Alkenes: nomenclature, double-bond structure of ethene, geometrical isomerism, physical properties up to 3 carbons, preparation; addition of hydrogen, halogens, water and hydrogen halides; Markovnikov's addition; peroxide effect; ozonolysis; oxidation; electrophilic-addition mechanism. Alkynes: nomenclature; triple-bond structure of ethyne; physical and chemical properties up to 3 carbons; preparation; addition of hydrogen, halogens, hydrogen halides and water. Aromatic hydrocarbons: introduction; IUPAC nomenclature; benzene; resonance; Hückel's rule; aromaticity; electrophilic substitution mechanism; nitration; sulphonation; halogenation; Friedel-Crafts alkylation and acylation.
Haloalkanes and Haloarenes	Haloalkanes: nomenclature; nature of C–X bond; physical and chemical properties; mechanism of substitution reactions; stability of carbocations; R/S and D/L configurations; uses and environmental effects of dichloromethane, trichloromethane, tetrachloromethane, iodoform and freons. Haloarenes: nature of C–X bond; substitution reaction; directive influence of halogen for monosubstituted compounds; stability of carbocations; uses and environmental effects of DDT.
Alcohols, Phenols and Ethers	Alcohols: nomenclature; methods of preparation; physical and chemical properties of primary alcohols; identification of primary, secondary and tertiary alcohols; mechanism of dehydration; uses of methanol and ethanol. Phenols: nomenclature; preparation; physical and chemical properties; acidic nature; electrophilic substitution reactions; uses of phenolic compounds. Ethers: nomenclature; preparation; physical and chemical properties; uses.

Aldehydes, Ketones and Carboxylic Acids – Aldehydes & Ketones	Nomenclature; nature of carbonyl group; methods of preparation; physical and chemical properties; mechanism of nucleophilic addition; reactivity of alpha hydrogen in aldehydes; uses.
Aldehydes, Ketones and Carboxylic Acids – Carboxylic Acids	Nomenclature; acidic nature; methods of preparation; physical and chemical properties; uses.
Organic Compounds Containing Nitrogen – Nitro Compounds	General methods of preparation; reduction reactions of nitro compounds.
Organic Compounds Containing Nitrogen – Amines	Nomenclature; classification; structure; methods of preparation; physical and chemical properties; uses; identification of primary, secondary and tertiary amines.
Cyanides and Isocyanides	Nomenclature; structure; methods of preparation; chemical reactions - hydrolysis and reduction reactions only.
Diazonium Salts	Preparation of diazonium salts; chemical reactions; importance in synthetic organic chemistry.
Biomolecules – Carbohydrates	Classification into aldoses and ketoses; monosaccharides - glucose and fructose; D/L configuration; oligosaccharides - sucrose; polysaccharides - starch and cellulose.
Biomolecules – Proteins	Elementary idea of α -amino acids; zwitterionic structures; peptide bonds; polypeptides; structure of proteins - primary structure only; denaturation of proteins; enzymes.
Biomolecules – Nucleic Acids	DNA and RNA - introduction and basic concepts.
Polymers	Classification into natural and synthetic polymers; methods of polymerisation - addition and condensation; copolymerisation; important polymers: polythene, nylon, polyesters, Bakelite and rubber; biodegradable and non-biodegradable polymers.

WBJEE Inorganic Chemistry Syllabus 2027

The WBJEE 2027 Inorganic Chemistry topic list consists of **p-Block Elements, d- and f-Block Elements, Coordination Compounds, etc.**

Topics	Sub-Topics
s-Block Elements (Groups 1 & 2)	Electronic configuration; occurrence; trends in properties such as ionisation enthalpy, atomic and ionic radii; chemical reactivity with oxygen, water, hydrogen and halogens; hydrides - ionic, covalent and interstitial; hydrogen peroxide - preparation, properties, structure and uses; hydrogen as a fuel; biological importance of Na, K, Mg and Ca.
p-Block Elements – General & Group 13	General introduction to p-block elements; electronic configuration; occurrence; variation in properties; oxidation states; trends in chemical reactivity. Group 13: Boron — physical and chemical properties of compounds; boron oxides; boric acid; borates; inorganic graphite. Aluminium: reactions with acids and alkalis.
p-Block Elements – Group 14	Carbon: catenation; allotropic forms; nanocarbon; graphene; physical and chemical properties of CO and CO ₂ . Silicon: compounds and important uses; silicon tetrachloride - structure, preparation, hydrolysis and reduction; silicates - structure of open-chain silicates and construction of ions; uses of zeolites.

p-Block Elements – Group 15	General introduction; electronic configuration; occurrence; oxidation states; structure and reactions of NH_3 , HNO_3 and NCl_3 ; structures of nitrogen oxides; phosphorus - allotropes (white and red); preparation and properties of phosphine; phosphorus halides PCl_3 and PCl_5 ; oxoacids of phosphorus - elementary idea.
p-Block Elements – Group 16	General introduction; electronic configuration; occurrence; oxidation states. Oxygen: classification of oxides; preparation and properties of ozone. Sulphur: rhombic and monoclinic allotropes; properties and uses of sulphur oxides, oxoacids and peracids.
p-Block Elements – Group 17	General introduction; electronic configuration; oxidation states; occurrence; trends in physical and chemical properties; halogen compounds; preparation, structure and uses of oxides and oxoacids of halogens; interhalogen compounds; elementary idea of pseudohalogens and polyhalides.
p-Block Elements – Group 18	General introduction; electronic configuration; occurrence and uses of noble gases; preparation, structure and chemical reactions.
d- and f-Block Elements – Transition Metals	General introduction; electronic configuration; occurrence; characteristics of transition metals; general trends in first-row transition metals — ionic radii, ionisation enthalpy, oxidation states, colour, catalytic properties and magnetic properties.
d- and f-Block Elements – Lanthanoids	Electronic configuration; oxidation states; chemical reactivity; lanthanoid contraction and its consequences; uses.
d- and f-Block Elements – Actinoids	Electronic configuration; oxidation states; comparison with lanthanoids; uses.
Coordination Compounds	Introduction; ligands; classification of ligands based on denticity and field strength; coordination number; colour; magnetic properties; IUPAC nomenclature of mononuclear coordination compounds; EAN rule; bonding - Werner's theory, VBT and CFT, CFSE; structural isomerism; stereoisomerism; importance of coordination compounds in qualitative analysis, extraction of metals and biological systems.

WBJEE Environmental Chemistry Syllabus 2027

The WBJEE exam syllabus 2027 Environmental Chemistry paper includes **Qualitative & Quantitative Analysis and Environmental Chemistry**.

Topics	Sub-Topics
Environmental Chemistry	Environmental pollution - air, water and soil pollution; causes and effects; primary and secondary pollutants solid and liquid pollutants; chemical reactions in the atmosphere; smog; pollution due to industrial wastes; solid-waste management - elementary idea; SPM; RSPM; green chemistry as an alternative tool for reducing pollution; water preservation and protection; strategies for controlling environmental pollution
Qualitative & Quantitative Analysis	Detection of special elements N, S and halogens in organic compounds by Lassaigne's test; identification of functional groups - primary aromatic amine, aldehyde, ketone, carboxylic acid and unsaturation; calculation based on acid-base and redox titrations; dichromatometry and permanganometry; detection of water-soluble, non-interfering acid and basic radicals by dry and wet tests.

WBJEE Physics Syllabus

Topics	Sub-Topics
Physical World, Measurements, Units and Dimensions	Physical quantities, Units and dimensions, Dimensional analysis, Applications of dimensional analysis; Significant figures
Kinematics	Scalars and vectors, Representation of vectors in three dimensions, Dot and cross products, Applications of Elementary differential and integral calculus, Time-velocity graphs, Equations of motion, Uniformly accelerated
Laws of Motion	Newton's laws of motion, Applications using algebra and calculus, Inertial and non-inertial frames, Conservation of momentum, Elastic and inelastic collisions, Impulse, Centripetal force, Banking of roads, Relative velocity, Uniform circular motion
Work, Power and Energy	Work, Work-energy theorem, Power, Kinetic energy, Potential energy, Work done by constant forces, Work done by variable forces, Conservation of mechanical energy, Conservative and non-conservative forces, Potential energy of a spring
Centre of Mass, Rotational Motion and Friction	Centre of mass of a two-particle system, Motion of connected systems, Torque, Equilibrium of rigid bodies, Moment of inertia, Simple geometric bodies, Conservation of angular momentum, Friction, Laws of friction
Gravitation	Kepler's laws, Universal law of gravitation, Acceleration due to gravity, Variation of g, Gravitational potential, Gravitational potential energy, Escape velocity, Orbital velocity, Satellites, Geostationary orbits
Properties of Matter	Elasticity: Hooke's law, Young's modulus, Bulk modulus, Shear/rigidity modulus, Poisson's ratio, Elastic potential energy
	Fluids: Fluid pressure, Pressure due to a fluid column, Buoyancy, Pascal's law, Effect of gravity on fluids, Viscosity
	Surface Tension: Surface energy, Surface tension phenomena, Angle of contact, Capillary rise
	Viscosity: Coefficient of viscosity, Streamline and turbulent flow, Reynolds number, Stokes' law, Terminal velocity
Heat and Thermal Physics	Heat and temperature, Thermal expansion of solids, liquids and gases, Ideal gas laws, Isothermal and adiabatic processes, Anomalous expansion of water, Specific heat capacity, Calorimetry, Change of state, Latent heat, Heat conduction, Thermal conductivity, Convection, Radiation, Newton's law of cooling, Stefan's law
Thermodynamics	Thermal equilibrium, Zeroth law of thermodynamics, Heat, Work, Internal energy, First law of thermodynamics, Thermodynamic process, Adiabatic process, Second law of thermodynamics, Reversible and irreversible processes
Kinetic Theory of Gases	Equation of state of an ideal gas, Assumptions of kinetic theory, Molecular interpretation of pressure, Mean square speed, Degrees of freedom, Law of equipartition of energy, Specific heats of gases, Mean free path, Avogadro's number
Oscillations and Waves	Periodic motion, Time period, Frequency, Time-displacement equation, Simple harmonic motion, Phase difference, SHM systems, Restoring force, Force constant, Energy in SHM, Kinetic and potential energy, Free, damped and forced oscillations, Resonance, Wave motion, Progressive waves, Longitudinal and transverse waves, Sound waves, Newton's correction, Velocity of sound in air, Superposition principle, Reflection of waves, Standing waves, String vibrations, Fundamental mode, Harmonics and overtones, Beats, Doppler effect
Electrostatics	Conservation of electric charge, Coulomb's law, Force between multiple charges, Superposition principle, Electric field distribution, Electric field, Electric potential, Electric field lines, Electric dipole, Electric field due to a dipole, Gauss's law, Electric flux, Gauss' theorem, Applications of Gauss' law, Conductors and insulators, Free and bound charges, Electric polarization, Capacitors, Capacitance, Series and parallel combination, Parallel-plate capacitor, Energy stored in a capacitor

Current Electricity	Electric current, Conductors, Drift velocity, Mobility, Ohm's law, Resistance, Ohmic and non-ohmic co and power, Carbon resistors, Resistor colour codes, Combination of resistances, Temperature depen EMF, Internal resistance, Potential difference, Combination of cells, Secondary cells, Kirchhoff's laws Metre bridge, Potentiometer, Thermoelectricity, Seebeck effect, Peltier effect, Thermo-emf
Magnetic Effects of Current	Magnetic field, Oersted's experiment, Biot-Savart law, Magnetic field due to circular current loop, Am conductor, Solenoids, Toroidal solenoids, Motion of charged particles in magnetic fields, Motion in ele Cyclotron frequency, Force on current-carrying conductor, Force between parallel current-carrying co current loop, Moving-coil galvanometer, Current sensitivity, Conversion of galvanometer into ammete extension of ammeter and voltmeter
Magnetism	Current loop as magnetic dipole, Magnetic dipole moment, Magnetic moment of revolving electron, M magnet, Axial and equatorial fields, Torque on magnetic dipole, Magnet as equivalent solenoid, Magn magnetic field, Magnetic elements of Earth, Diamagnetic substances, Paramagnetic substances, Fer Electromagnets, Factors affecting electromagnet strength, Permanent magnets
Electromagnetic Induction and Alternating Current	Electromagnetic induction, Faraday's laws, Induced EMF, Induced current, Lenz's law, Eddy currents induction, Alternating current, Peak and RMS values, AC voltage, Reactance, Impedance, LR circuits difference, LCR series circuit, Resonance, Power in AC circuits, Wattless current
Electromagnetic Waves	Electromagnetic waves, Characteristics, Transverse nature, Electromagnetic spectrum, Applications i spectrum
Optics – Ray Optics	Reflection, Spherical mirrors, Mirror formula, Refraction, Total internal reflection, Optical fibres, Refra Lenses, Thin lens formula, Lens maker's formula, Newton's relation, Displacement method, Conjugat Power of lens, Combination of thin lenses, Combination of lens and mirror, Prism, Dispersion, Optica Accommodation, Myopia and hypermetropia, Correction of eye defects, Microscopes, Astronomical te power
Optics – Wave Optics	Scattering of light, Blue colour of sky, Elementary idea of Raman effect, Wavefront, Huygens' principl using wavefronts, Interference, Young's double-slit experiment, Fringe width, Coherent sources, Frau slit diffraction
Particle Nature of Light and Wave-Particle Dualism	Photoelectric effect, Hertz's observations, Lenard's observations, Einstein's photoelectric equation, P Matter waves, de Broglie relation, Wave nature of particles
Atomic Physics	Alpha-particle scattering, Rutherford's nuclear model, Bohr model, Energy levels, Hydrogen spectrun Characteristic X-rays
Nuclear Physics	Composition of nucleus, Nuclear size, Atomic masses, Isotopes, Isobars, Isotones, Radioactivity, Alpl radiation, Radioactive decay law, Mass-energy relation, Mass defect, Binding energy, Binding energy fission, Nuclear fusion
Solid-State Electronics	Energy bands, Conductors, Insulators, Semiconductors, Semiconductor diode, I-V characteristics, Fo Rectifiers, LED, Photodiode, Solar cell, Zener diode, Zener diode as voltage regulator, BJT, Transisto characteristics, BJT as amplifier, CE configuration, Transistor oscillator, Logic gates

WBJEE Mathematics Syllabus

1. Algebra: A.P., G.P., H.P.

- **Topics:** Definitions of A.P., G.P., and H.P.; General term; Summation of first n -terms of series $\sum n$, $\sum n^2$, $\sum n^3$; Arithmetic/Geometric series, A.M., G.M. and their relation; Infinite G.P. series and its sum.

2. Logarithms

- **Topics:** Definition; General properties; Change of base.

3. Complex Numbers

- **Topics:** Definition in terms of ordered pair of real numbers and its representation in a plane; Argand plane and properties of complex numbers; Complex conjugate; Triangle inequality; Amplitude of complex numbers and its properties; Square root of complex numbers; Cube roots of unity and its applications; De Moivre's theorem (statement only) and its elementary applications; Solution of quadratic equation in the complex number system.

4. Polynomial Equation

- **Topics:** Polynomial equation with real coefficients; Fundamental theorem of Algebra; Quadratic equations with real coefficients; Relations between roots and coefficients; Nature of roots; Formation of a quadratic equation; Sign and magnitude of the quadratic expression $ax^2 + bx + c$ (where a, b, c are rational numbers and $a \neq 0$).

5. Permutation and Combination

- **Topics:** Permutation of n different things taken r at a time ($r \leq n$); The permutation of things which are not all different; Permutation with repetitions; Combinations of n different things taken r at a time ($r \leq n$); Combination of things not all different; Problems involving both permutations and combinations.

6. Principle of Mathematical Induction

- **Topics:** Statement of the principle; Proof by induction for the sum of squares; The sum of cubes of first n natural numbers; Divisibility properties like $2^{2n} - 1$ is divisible by 3 ($n \geq 1$), 7 divides $3^{2n+1} + 2^{n+2}$ ($n \geq 1$), etc.

7. Binomial Theorem (positive integral index)

- **Topics:** Statement of the theorem; General term; Middle term; Equidistant terms and Properties of binomial coefficients and its applications.

8. Matrices & Determinants

- **Topics:** Concepts of $m \times n$ ($m \leq 3, n \leq 3$) real matrices; Operations of addition, Scalar multiplication and Multiplication of matrices; Transpose of a matrix; Determinant of a square matrix; Properties of determinants; Minor, Cofactor and Adjoint of a matrix; Non-singular matrix; The inverse of a matrix; Solutions of system of linear equations (Not more than 3 variables); Application of Determinants in finding the area of triangle.

9. Sets, Relations and Mappings

- **Topics:** Concept of sets; Subsets, Power set, Complement, Union, Intersection, Difference and Symmetric difference of sets; Venn diagram; De Morgan's Laws; Inclusion / Exclusion formula for at most three sets; Cartesian product of sets.

10. Relation and its Properties

- **Topics:** Equivalence relation — definition and elementary examples; Mapping; Range and Domain; Injective, Surjective, and Bijective mappings; Composition of mappings; Inverse of a mapping.

11. Statistics and Probability

- **Topics:** Measure of dispersion; Mean; Variance and Standard deviation; Frequency distribution; Notion of probability; Addition and Multiplication rules of probability; Conditional probability and Bayes' Theorem; Independence of events; Repeated independent trials and Binomial distribution.

12. Trigonometry

- **Topics:** Trigonometric functions; Compound angles; Addition and Subtraction formulae; Formulae involving Multiple and Submultiple angles; General solution of trigonometric equations; Inverse trigonometric functions and their properties.

13. Coordinate Geometry of Two Dimensions: Coordinates

- **Topics:** Distance formula; Section formula; Area of a triangle; Condition of collinearity of three points in a plane; Polar coordinates; Transformation from Cartesian to polar coordinates and vice versa; Parallel transformation of axes;

Concept of locus; Problems on Locus involving familiar geometrical configurations.

14. Straight Lines

- **Topics:** The slope of a straight line; Equation of straight lines in different forms; The angle between two straight lines; Condition of perpendicularity and parallelism of two straight lines; Distance of a point from a straight line; Distance between two parallel straight lines; Straight lines through the point of intersection of two straight lines; Equations of bisectors of angles between two straight lines.

15. Circle & Conic Sections

- **Topics:** Equation of a circle with a given centre and radius; Condition that a general equation of second degree in x, y may represent a circle; Equation of a circle in terms of endpoints of a diameter; Parametric equation of a circle; Equation of tangent, normal and chord of a Circle; The intersection of a straight line with a circle; Equation of common chord and common tangent of two intersecting circles; Definition of conic section; Directrix, Focus and Eccentricity; Classification based on eccentricity; Equation of Parabola, Ellipse and Hyperbola in standard form; Their foci, directrices, eccentricities and parametric equations.

16. Co-ordinate Geometry of Three Dimensions

- **Topics:** Direction cosines and Direction ratios; Distance between two points and Section formula; Equation of a straight line; Equation of a plane and Distance of a point from a plane and straight lines; Angle between two straight lines; Shortest distance between two skew lines.

17. Differential Calculus

- **Topics:** Functions; Domain and Range of functions; Composition of two functions and Inverse of a function; Basic properties of functions; Limit; Continuity; Differentiability; Derivative; Chain rule and Derivative of functions in various forms; Concept of differential and its applications; Second order derivative.

18. Rolle's Theorem and Lagrange's Mean Value Theorem

- **Topics:** Statement only for Rolle's Theorem and Lagrange's Mean Value Theorem; Their geometric interpretation and Elementary application;

L'Hospital's rule (statement only) and applications.

19. Integral Calculus

- **Topics:** Integration as a reverse process of differentiation; Indefinite integral of standard functions; Integration by parts; Integration by substitution and Partial fraction; Definite integral as a limit of a sum with equal subdivisions; Fundamental theorem of integral calculus and its applications; Properties of definite integrals.

20. Differential Equations

- **Topics:** Formation of ordinary differential equations; Order and Degree of differential equations; Solution of homogeneous differential equations; Separation of variables method; Linear first order differential equations.

21. Application of Calculus

- **Topics:** Differential coefficient as a measure of rate; Determination of monotonicity of functions; Maxima and Minima of functions; Tangent and Normal; Conditions of tangency; Motion in a straight line with constant acceleration; Calculation of area bounded by elementary curves and Straight lines; The area of the region included between two elementary curves.

22. Vectors

- **Topics:** Addition of vectors; Scalar multiplication; Dot and Cross products; Scalar triple product; Geometrical interpretation of these products and their applications.