

JEE Main 2022 Syllabus

Syllabus of JEE Main 2022 will be released by NTA along with official notification at jeemain.nta.nic.in. The syllabus for each year remains the same while NTA occasionally changes the pattern of the test. We have provided the complete syllabus of JEE Main 2021, comprising the subject-wise topics which will be asked in NTA JEE Main. Using the JEE Main 2021 syllabus, candidates can start preparing for the JEE Main 2022 exam.

Physics **Class 11th**

Chapter-1 : Units and Measurement

Topics :

- Concept of measurement of physical quantity
- International system of units
- Measurement of physical parameters like length, mass and time
- Dimensions of various physical quantities
- Principle of Homogeneity
- Applications of dimensional analysis:-
 1. Check the dimensional correctness
 2. Conversion of one physical quantity into other
 3. Derivation of new relations
- Accuracy and Precision of instruments
- Errors (with its types)
- Propagation of errors in different operations like sum, difference, product and division
- Significant figures and different operations with significant figures
- Rules of Rounding off

Chapter-2 : Motion in a Straight Line

Topics :

- Concept of position, path length, displacement, average velocity and average speed, Instantaneous velocity and speed.
- Differentiation, its physical significance, Important formulae for Differentiation
- Application of Differentiation
- Integration, its physical significance, Important formulae
- Application of integration
- Average and Instantaneous acceleration, Kinematics of non uniformly
- Uniformly accelerated motion

- Graphs between position, velocity, acceleration and time for uniform and nonuniform accelerated
- Relative velocity in one Dimension

Chapter-3 : Scalars and Vectors

Topics :

- Resolution of vectors, Vector addition and subtraction using resolution
- Multiplication of vectors by real numbers, Addition and subtraction of vectors-graphical method (triangle law and parallelogram Law)
- Scalar product of vectors
- Cross product of vectors

Chapter-4 : Motion in a Plane

Topics :

- Motion in a plane with constant acceleration, Projectile motion, Ground to ground Projection, Maximum height, Range, Time of flight
- Equation of trajectory for Ground to ground projection, Horizontal/Oblique projection from a height
- Projectile motion along inclined plane
- Relative velocity in Two-Dimensions
- Kinematics of uniform and nonuniform circular Motion

Chapter-5 : Newton's Law of Motion

Topics :

- The law of inertia, Newton's first law of motion, Momentum, Newton's second law of motion
- Impulse, Newton's third law of motion, Conservation of linear momentum.
- Equilibrium of a particle, Common forces in mechanics (Weight, tension, normal reaction, Spring force)
- Motion of connected bodies, Motion of a body on an inclined plane, Pulley block system
- Problems on pulley block system (including movable pulley)
- Problems involving Movable Wedge
- Friction, Static and Kinetic friction, Motion on a fixed rough surface
- Inertial and non-inertial frames, Pseudo force
- Circular motion and banking of roads.

Chapter-6 : Work, Energy and Power

Topics :

- Work (Positive, negative and zero work), Kinetic energy, Work energy theorem

- Work done by a constant and variable force, Power
- Conservative and non conservative forces. Concept of potential energy, Gravitational and spring potential energy
- Conservation of mechanical energy, Vertical circular motion
- Collisions head on elastic and head on inelastic collision
- Oblique elastic and Oblique inelastic collisions

Chapter-7 : System of Particles and Rotational Motion

Topics :

- Centre of mass of discrete particle system and continuous mass distribution
- Motion of centre of mass, Linear momentum of system of particles,
- Rigid body, Rigid body constraint for velocity and acceleration, Vector product of two vectors, Torque
- Equilibrium of a rigid body, Shifting of normal reaction and toppling
- Moment of inertia for discrete particle system, Uniform symmetric bodies
- Theorems of perpendicular and parallel axis
- Dynamics of rotational motion about a fixed axis.
- General motion of rigid body, Kinematics of rolling motion
- Dynamics of Rolling Motion
- Rotational Kinetic energy and work energy theorem for rigid body.
- Angular momentum of a particle and system of particles. Angular momentum of rigid body
- Conservation of angular momentum
- Angular Impulse, Instantaneous axis of rotation

Chapter-8 : Gravitation

Topics :

- Universal law of Gravitation, The gravitational constant, Acceleration due to gravity upon the Earth's surface, Acceleration due to gravity above the surface of earth, Acceleration due to gravity below the surface of the earth. Variation of g due to shape of the earth, variation of g due to rotation of earth about its own axis.
- Gravitational field, Gravitational field due to bodies of different shapes: Point mass, thin spherical shell, solid sphere, uniform ring
- Gravitational potential energy, Gravitational Potential energy of an object in the field of earth, Escape velocity
- Gravitational Potential, Relationship between field and potential, Gravitational potential due to different bodies: point mass, spherical shell, Solid sphere, ring
- Earth's Satellite, Energy of satellite, Geostationary and Polar satellite.
- Weightlessness, Kepler's laws of Planetary motion.

Chapter-9 : Mechanical Properties of Solid

Topics :

- Elastic potential energy, Poisson's ratio, Application of elastic behaviour of materials.

Chapter-10 : Mechanical Properties of Fluids

Topics :

- Pressure, density, Pascal's law, Variation of pressure with depth, Hydrostatic paradox, Hydraulic lift, Hydraulic brakes
- Force and torque due to hydrostatic pressure, Archimedes principle
- Liquids in accelerated containers, Container having vertical acceleration, Container having horizontal acceleration, Horizontally accelerated U-tube, Pressure in a rotating frame.
- Streamline flow, Equation of continuity, Bernoulli's principle, Applications of Bernoulli's theorem
- Surface tension, Surface energy, angle of contact, Excess pressure, Capillary rise
- Viscosity, Stoke's law, Terminal velocity, Reynolds number, Poiseuille's formula

Chapter-11 : Thermal Properties of Matter

Topics :

- Temperature and Heat, Measurement of temperature, Thermal expansion, Linear expansion, Volume expansion, Relation between volume expansion and linear expansion, Bimetallic strip
- Change of density with temperature, Thermal expansion and interatomic energy, Thermal stress, Specific heat capacity, Latent heat, Calorimetry
- Heat transfer - Conduction, Fourier's law of heat conduction, Steady state heat conduction, thermal resistance, Growth of ice in pond.
- Convection, radiation, black body, Newton's law of cooling, Stefan's law, Kirchhoff's law, energy distribution of black body radiation, Wein's displacement law

Chapter-12 : Thermodynamics

Topics :

- Thermal equilibrium, Zeroth law of thermodynamics, Thermodynamic state variables and equation of state. Heat, internal energy and work
- Calculating work done by a gas, Calculating work done by indicator diagram, First law of thermodynamics
- Specific heat capacity, Calculating molar heat capacity of a gas, various Thermodynamic process, Polytropic

- Heat engines, Refrigerators and heat pumps, Second law of thermodynamics, Reversible and irreversible process, Carnot's Engine.

Chapter-13 : Kinetic Theory of Gases

Topics :

- Molecular nature of matter, behaviour of gases
- Gas Laws, Kinetic theory of an ideal gas
- Pressure exerted by a gas
- Law of equipartition of energy
- Specific heat capacity
- Mean free path.

Chapter-14 : Oscillations

Topics :

- Periodic and oscillatory motions, Simple harmonic motion and uniform circular motion, Velocity and acceleration in simple harmonic motion
- Force law for simple harmonic motion, Energy in simple harmonic motion
Calculation of time period of spring block system
- Combination of springs, SHM of two particle system
- Angular SHM, Simple pendulum and physical pendulum, Torsion pendulum
- Damped simple harmonic motion, Forced oscillations and resonance.

Chapter-15 : Waves

Topics :

- Progressive wave and its types (Transverse and longitudinal); Wave pulse; Wave function and equation of a plane progressive harmonic wave.
- Phase difference, Path difference; Particle velocity, Particle acceleration
- Velocity of transverse wave in string, Velocity of longitudinal waves (sound wave); intensity and loudness, power transmitted in waves, Superposition of waves, Reflection and refraction of waves
- Standing waves and its wave function; Standing waves in string fixed at both ends/Free at one end
- Organ pipe, Resonance tube and end correction
- Interference of sound waves; Condition for maxima and minima in terms of phase difference and path difference
- Beats, definition of beat frequency and calculation of beat frequency
- Application of beats to find unknown frequency, Doppler effect; Mixed problem on Doppler effect and beats.

Class 12th

Chapter-15 : Electric Charge and Fields

Topics :

- Electric charges, Conductors and insulators, Charging by induction, Charging by friction, properties of electric charge
- Coulomb's law, Vector form of Coulomb's law, principle of superposition, forces between multiple charges
- Electric field, Electric field due to a point charge, superposition principle, Electric field due to a group of charges
- Electric dipole, Dipole moment, electric field due to an electric dipole on axial line, equatorial line and At any other point.
- Electric dipole, in a uniform electric field, Potential energy associated with dipole, Dipole in non-uniform electric field, Dipole oscillation.
- Motion of a charged particle in uniform electric field, Electric field of a continuous charge distribution, volume, surface and linear charge distribution
- Electric field due to a linear charge distribution like a straight rod, Electric field on the axis of a disc, ring and other cases of interest
- Gauss's Law and application, Calculating electric field using Gauss's law. Electric field due to a point charge, An infinite linear charge distribution, A hollow cylinder of charge, Charged solid cylinder
- A shell of charge, Uniform sphere of charge, An infinite thin non conducting sheet

Chapter-16 : Electrostatic Potential and Capacitance

Topics :

- Electrostatic potential energy, Electrostatic potential energy of two and more point charges
- Electrostatic potential, Potential difference, Potential due to a point charge, Potential due to system of charges
- Potential due to continuous charge distribution e.g., Uniformly charged disc/ring, Relation between electric field and potential
- Electric potential of an Annulus, Potential due to a spherical shell, Uniform sphere of charge, infinite long linear charge.
- Equipotential surface, Equipotential surface due to a point charge and electric dipole, a long linear charge, Plane sheet of charge
- Electrostatics of conductors : A conductor placed in an electric field, A charged isolated conductor. Electric field near the surface of conductor, The role of sharp points on conducting surfaces.
- Conductor with cavity, Electrostatic pressure, Grounding of conductors, Dielectrics and polarisation, Capacitor and Capacitance

- Types of capacitors-Parallel plate Capacitor, spherical capacitor, Cylindrical capacitor
- Charging of a capacitor, Energy stored in a capacitor, Force between the plates of a parallel plate capacitor
- Grouping of capacitors, Capacitors with dielectrics, sharing of charge and common potential
- Laws for solving complex circuits of capacitors, Van De Graff Generator

Chapter-17 : Current Electricity

Topics :

- Electric current, Electric current in conductors, Ohm's law, Factors affecting resistance of a conductor. Resistor colour codes, Temperature dependence of resistivity
- Current density and electric field, Drift of electrons and the origin of resistivity, mobility, limitations of Ohm's law, Calculating resistance for different shapes.
- Electrical energy, Power, Combination of resistors, Cells, emf and internal resistance of a cell, Maximum power transfer theorem.
- Cells in series and parallel, Kirchoff's law
- Earthing or grounding in an electric circuit. Wheatstone bridge, Equivalent resistance of complex networks.
- Metering circuits, Galvanometer, Ammeter, Conversion of galvanometer to ammeter, Voltmeter, Conversion of galvanometer to voltmeter
- Error in the measurement but ammeter/voltmeter. Meter bridge, potentiometer application of potentiometer, Sensitivity of potentiometer.
- R-C circuit, Steady state R-C circuit, Transient R-C circuit, Charging and discharging of a capacitor through resistance. Complex RC circuit.

Chapter-18 : Moving Charges and Magnetism

Topics :

- Magnetic force (Lorentz force), Direction of magnetic force (Fleming's left hand rule), Properties of magnetic force on charge
- Magnetic field due to a current element (Biot-savart law), Magnetic field Surrounding a thin straight current carrying conductor.
- Magnetic field due to a loop of current on its axial point at centre. Magnetic field due to an arc at its centre. Magnetic field due to different combined structures.
- Ampere's circuital law. Applications of Ampere's law (a) magnetic field due to a straight infinite current carrying wire. (b) Magnetic field inside a long straight current carrying conductor (c) Magnetic field inside a hollow straight current carrying conductor, (d) Magnetic field due to an infinite plane sheet of current, (e) Magnetic field due to a long solenoid, (f) Magnetic field of a toroid.

- Magnetic force on a current carrying conductor. Force between two parallel current carrying wires. Force between two perpendicular current carrying wires.
- Motion of charged particle in a Magnetic field
- Motion of charged particles in combined electric and magnetic fields. (a) V , E and B all parallel to each other, (b) V , E and b all perpendicular to each other, (c) E is parallel to B and particle velocity is perpendicular to both these fields.
- Cyclotron, Current loop as a magnetic dipole, Torque on a current loop in a uniform magnetic field. The magnetic dipole moment of a revolving electron. The moving coil galvanometer.

Chapter-19 : Magnetism and Matter

Topics :

- Bar Magnet, magnetic field Lines, Pole strength, Bar magnet as an equivalent solenoid, Magnetic dipole moment of a bar magnet. Magnetic field due to a bar magnet (a) On axial position, (b) On normal bisector.
- Dipole in uniform magnetic field. Torque on a magnetic dipole in a uniform magnetic field. Work Done in rotating dipole in uniform magnetic field. Potential energy of dipole in uniform magnetic field. Tangent law. Deflection galvanometer.
- Gauss's law, Earth's Magnetism, Geographical meridian, Magnetic meridian, Magnetic Declination and dip. Horizontal and vertical component of earth magnetic field. Relation between horizontal component, Vertical component and angle of dip.
- Magnetization and Magnetic Intensity, Magnetic Susceptibility, Magnetic Permeability, Relative permeability. Magnetic properties of Material (a) Diamagnetism (b) paramagnetism (c) ferromagnetism (d) Hysteresis (d) Curie's law. Hard and soft magnets. Permanent magnet and Electromagnets.

Chapter-20 : Electromagnetic Induction

Topics :

- The experiments of Faraday and henry. Magnetic flux. Faraday's law of induction, Lenz's law. Lenz's law and conservation of energy. Methods to change the magnetic flux.
- Induced emf, induced current and induced charge in different cases. Field induction, induced electric field, induced electric field in a cylindrical region. Examples based on calculation of emf induced in rods placed in various positions in the cylindrical region.
- Motional emf in a straight conductor, effective length concept. Energy consideration. Eddy current, Electromagnetic damping, DC motor
- Inductance and inductor, self inductance, Potential difference across an inductor, energy stored in an inductor, energy density. Grouping of inductors

- Mutual inductance, Calculation of mutual inductance for two coils. Mutual inductance of a solenoid surrounded by a coil. Coefficient of coupling. Combination of inductances by taking into account their mutual inductance.
- L-R circuit (growth of current and decay of current) steady state LR circuit, steady state LCR-circuits. Currents in various branches just after closing and just after opening the switch. Time constant of complex LR circuits, AC generator

Chapter-21 : Alternating Current

Topics :

- Alternating current and emf, Mean value for half cycle of AC, Root mean square value of AC, Phasor diagram, Hot wire instrument, AC voltage applied to a resistor, Inductor and capacitor. AC through an L-R circuit, AC through an R-C circuit.
- AC voltage applied to a series LCR circuit, Resonance, sharpness of resonance, Parallel resonance circuit, Power in AC circuit (the power factor) Choke coil, LC oscillation, Transformer

Chapter-22 : Electromagnetic Current

Topics :

- Ampere circuital law and its contradiction,
- Displacement current, Consequences of displacement current
- Maxwell equation, Sources of electromagnetic waves, Relation between Electric field, Magnetic Field and speed of light, Intensity of electromagnetic waves; intensity due to a point source,
- Electromagnetic Spectrum

Chapter-23 : Ray Optics

Topics :

- Concept of rays; Laws of reflection; Plane mirrors; (reflection from plane surface); image formation and characteristics of image; Speed of image of moving object
- No. of images due to two inclined mirrors; Field of view and minimum size of mirror to view full image of the persons; Minimum size of mirror to view full length of wall behind the person, Field of view
- Reflection from curved surface; Pole, principal axis, centre of curvature, etc.; Mirror equation; (graph between) $1/v$ and $1/u$, between v and u); Magnification; (lateral as well as longitudinal); Coordinates of image if point object is not at principal axis; image speed when object is moving
- Refraction at plane surface, laws of refraction; Finding refracted ray, given incident ray vector; Apparent depth in the case of multi-layer of media.

- Total internal reflection; (critical angle); Mirage, optical fibres; shift due to a slab, Path of a ray of light in a medium of variable refractive index
- Refraction from spherical surfaces; Refraction from single spherical surface; (relation between image distance and object distance) Lenses; Lens - maker's formula; Different types of lenses, eg. Biconvex, Biconcave, Plano convex etc.
- Lenses; Lens formula image formation due to lens ; (convex and concave); Magnification of image due to lens, Lens Constant.; Displacement method to determine the focal length of a convex lens.
- Power of a lens; Power of a combination of thin lenses in contact; Equivalent focal length; (power) of a combination of two lenses separated by a distance; Behaviour of lens silvered on one face
- Prism; Expression for deviation due to prism; Deviation due to thin prism; Minimum deviation and calculation of refractive index with the help of minimum deviation; Condition for no emergence of ray from prism; Dispersion and deviation due to prism, dispersive power; Condition for dispersion without deviation and deviation without dispersion
- Optical Instruments; Simple microscope; (magnification in normal adjustment and adjustment for least distance); Compound microscope; (magnification in both adjustments - normal as well as for least distance) tube length; Telescope; (magnification in both adjustments), tube - length

Chapter-24 : Wave Optics

Topics :

- Wave optics; Concept of wavefront and ray; Huygens construction; Explanation of laws of reflection and refraction; Behaviour of mirrors, lenses and prisms according to wave-model
- Coherent and Incoherent source of light, Interference of light - Mathematical analysis, Young's Double slit experiment, locations of bright and dark fringes
- Shape of fringes on screen, fringe-width; Effect on fringe - width if colour of light changed, if experimental set - up is dipped in liquid; Intensity variation, fringe visibility.
- Interference; Interference experiment with bi-chromatic light, coincidence of two bright fringes or dark fringes; Optical path, displacement of fringes due to introduction of a transparent slab in the path of waves
- Diffraction, Resolving power of optical instruments, validity of ray optics, Polarization, Intensity of transmitted light, Law of Malus, Brewster's Law

Chapter-25 : Dual Nature of Radiation and Matter

Topics :

- Electron Emission; Photoelectric effect; Work function; Stopping potential, its dependence on intensity and frequency of incident light; Failure of wave-model of light to explain out the above mentioned experimental findings, Hallwach and Lenard's observation, experimental study of photoelectric effect, laws of photoelectric emission, Einstein's theory of photons; Einstein's photoelectric equation
- Radiation pressures; (when light falls normally/obliquely); Matter - waves and de-Broglie wave-length; Davisson-Germer experiment, Compton effect

Chapter-26 : Atoms

Topics :

- Atomic structure; Thomson model; Rutherford's α -scattering exp.; atomic spectra, Bohr's model; (radius, speed of electron, energy) Line spectra of hydrogen atom.
- De Broglie's explanation of Bohr's second postulate of quantization, Examples based on above concepts, Atomic excitation due to collision
- X-rays; Coolidge tube arrangement; Characteristic and continuous X-rays; Minimum wavelength of continuous X-rays; Moseley's law and its derivation according to Bohr's model

Chapter-27 : Nuclei

Topics :

- Nucleus; Nuclear forces; Nuclear stability curve; Nuclear binding energy and example on its calculation; Mass defect; Packing fraction; Nuclear reactions; α , β , γ - decays
- Natural Radioactivity and law of radioactive decay; Half - life; Average life' Activity; (its units); Examples based on above concepts; Determination of age of rock; Carbon - dating.
- Radioactive decay series; Successive disintegration and radioactive equilibrium; Examples based on above concepts; Problems based on nuclear collision and reactions.

Chapter-28 : Semiconductor Electronics Materials Devices and Simple Circuits

Topics :

- Classification of insulators, conductors and semiconductors, Intrinsic semiconductors, Extrinsic Semiconductors, Energy bands, PN type semiconductors
- PN Junction, Semiconductor Diode, Application of Junction Diode as a rectifier (Half wave Rectifier and Full Wave Rectifier) Special purpose PN Junction Diode
- Junction Transistor, Transistor as a device (Switch, Amplifier and oscillator)

- Digital electronics and logic gates

Chapter-29 : Communication Systems

Topics :

- Elements of communication system; Basic Terminology used in electronic communication system, bandwidth of signals, bandwidth of transmission medium, Modulation and its necessity, type of modulation, Amplitude modulation, Demodulation detection of amplitude modulated wave, Different communication system (Ground wave, Space wave, Sky wave, Satellite communication)

Chemistry

Class 11th

Chapter-1 : Some Basic Concepts of Chemistry

Topics :

- Nature of matter, laws of chemical combination, Dalton's atomic theory
- Atomic and molecular masses
- Mole concept and molar mass, percentage composition
- Empirical and molecular formula, chemical reactions
- Stoichiometry and calculations
- based on stoichiometry

Chapter-2 : Structure of Atom

Topics :

- 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

Chapter-3 : Classification of Elements and Periodicity in Properties

Topics :

- 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

Chapter-4 : Chemical Bonding and Molecular Structure

Topics :

- 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

Chapter-5 : States of Matter: Gases and Liquids

Topics :

- Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of the molecule
- Boyle's law, Charles law, Gay Lussac's law, Avogadro's law, ideal behaviour, empirical derivation of gas equation, Avogadro's number, ideal gas equation
- Deviation from ideal behaviour, liquefaction of gases, critical temperature, kinetic energy and molecular speeds (elementary idea)Liquid State- vapour pressure
- viscosity and surface tension (qualitative idea only, no mathematical derivations)

Chapter-6 : Chemical Thermodynamics

Topics :

- 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 ΔU and ΔH , 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)
- Third law of thermodynamics (brief introduction)

Chapter-7 : Equilibrium

Topics :

- 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
- Henderson Equation, hydrolysis of salts(elementary idea)
- Buffer solution, solubility product common ion effect (with illustrative examples)

Chapter-8 : Redox Reaction

Topics :

- 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

Chapter-9 : Hydrogen

Topics :

- 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, heavy water, hydrogen peroxide -preparation, reactions and structure and use;
- Hydrogen as a fuel

Chapter-10 : s -Block Elements (Alkali and Alkaline Earth Metals)

Topics :

- Group 1 Elements
- Group 2 Elements
- Preparation and Properties of Some Important Compounds

Chapter-11 : p -Block Elements

Topics :

- Group 13 Elements
- Group 14 Elements

Chapter-12 : Organic Chemistry - Some Basic Principles and Technique

Topics :

- 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 session of a covalent bond
- Free radicals, carbocations, carbanions, electrophiles and nucleophiles
- Types of organic reactions

Chapter-13 : Hydrocarbons**Topics :**

- Aliphatic Hydrocarbons: Alkanes
- Alkenes
- Alkynes
- Aromatic Hydrocarbons

Chapter-14 : Environmental Chemistry**Topics :**

- Environmental pollution

Class 12th**Chapter-15 : Solid State****Topics :**

- Classification of solids based on different binding forces: molecular, ionic covalent and metallic solids, amorphous and crystalline solids (elementary idea).
- Unit cell in two dimensional and three dimensional lattices
- Calculation of density of unit cell, packing in solids, packing efficiency, voids
- Band theory of metals, conductors, semiconductors and insulators and n & p type semiconductors

Chapter-16 : Solutions**Topics :**

- Types of solutions
- Expression of concentration of solutions of solids in liquids, solubility of gases in liquids
- Solid solutions, colligative properties - relative lowering of vapour pressure
- Raoult's law, elevation of boiling point, depression of freezing point
- Osmotic pressure, determination of molecular masses using colligative properties
- Abnormal molecular mass, van't Hoff factor

Chapter-17 : Electrochemistry

Topics :

- Redox reactions
- 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, 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
- Fuel cells, corrosion

Chapter-18 : Chemical Kinetics

Topics :

- 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

Chapter-19 : Surface Chemistry

Topics :

- Adsorption - physisorption and chemisorption
- Factors affecting adsorption of gases on solids, catalysis, homogeneous and heterogeneous activity and selectivity;
- Enzyme catalysis colloidal state distinction between true solutions, colloids and suspension; lyophilic, lyophobic multimolecular and macromolecular colloids
- Properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation, emulsion - types of emulsions

Chapter-20 : Isolation of Elements

Topics :

- Principles and methods of extraction - concentration, oxidation, reduction - electrolytic method and refining
- Occurrence and principles of extraction of aluminium, copper, zinc and iron

Chapter-21 : p-Block Elements

Topics :

- Electronic configuration, occurrence, oxidation states,
- Trends in physical and chemical properties of : Group 15 to 18 Elements

Chapter-22 : d and f Block Elements

Topics :

- Lanthanoids
- Actinoids

Chapter-23 : Coordination Compounds

Topics :

- 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 stereo isomerism
- Importance of coordination compounds (in qualitative inclusion, extraction of metals and biological system)

Chapter-24 : Haloalkanes and Haloarenes

Topics :

- Haloalkanes
- Haloarenes
- Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform freons, DDT

Chapter-25 : Alcohols, Phenols and Ethers

Topics :

- Nomenclature, methods of preparation,
- Physical and chemical properties of Alcohols, Phenols and Ethers

Chapter-26 : Aldehydes, Ketones and Carboxylic Acids

Topics :

- Nomenclature, nature of carbonyl group, methods of preparation of Aldehyde and Ketone
- Mechanism of nucleophilic addition
- Reactivity of alpha hydrogen in aldehydes
- Carboxylic Acids: Nomenclature, acidic nature

Chapter-27 : Organic Compounds containing Nitrogen

Topics :

- Amines
- Cyanides and Isocyanides
- Diazonium salts

Chapter-28 : Biomolecules

Topics :

- Carbohydrates
- Proteins
- Vitamins, Nucleic Acids

Chapter-28 : Polymers

Topics :

- Classification - natural and synthetic, methods of polymerization (addition and condensation), copolymerization
- Some important polymers: natural and synthetic like polythene, nylon polyesters, bakelite, rubber. Biodegradable and nonbiodegradable polymers

Chapter-29 : Chemistry in Everyday Life

Topics :

- Chemicals in medicines, Chemicals in food, Cleansing agents