



# ONLINE AADITYA TEST SERIES (OATS) - JEE-2021

## MISSION AIR-1 'परिश्रम की पराकाष्ठा'



The complete syllabus and schedule of the ONLINE IIT-JEE test series followed by the discussions by Subject Experts

SN	UNIT	Syllabus			TEST NAME	QUESTIONS	MARKS	WILL BE AVAILABLE	Discussions
		Physics	Chemistry	Mathematics					
1	I	Measurements, Kinamatics & Laws of Motion	Some Basic Concepts of Chemistry, Structure of Atom, Classification of Elements and Periodicity in Properties	Sets, Relations, Functions, Trigonometric inequalities, & Principle of Mathematical Induction	ConcepTest-1	180	720	07-Dec	13-Dec
		<p>Physics: Scope and excitement; nature of physical laws; Physics, technology and society.</p> <p>Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures.</p> <p>Dimensions of physical quantities, dimensional analysis and its applications.Kinematics</p> <p>Frame of reference, Motion in a straight line: Position-time graph, speed and velocity, Uniform and non-uniform motion, average speed and instantaneous velocity. Uniformly accelerated motion, velocity- time and position-time graphs, relations for uniformly accelerated motion (graphical treatment). Elementary concepts of differentiation and integration for describing motion.</p> <p>Scalar and vector quantities: Position and displacement vectors, general vectors and notation, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity.</p> <p>Unit vectors. Resolution of a vector in a plane – rectangular components. Scalar and Vector products of Vectors. Motion in a plane. Cases of uniform velocity and uniform acceleration – projectile motion. Uniform circular motion.</p> <p>Laws of Motion</p> <p>Intuitive concept of force. Inertia, Newton’s first law of motion; momentum and Newton’s second law of motion; impulse; Newton’s third law of motion.</p> <p>Law of conservation of linear momentum and its applications.</p> <p>Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication.</p> <p>Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road).</p>	<p>Some Basic Concepts of Chemistry</p> <p>General Introduction: Importance and scope of chemistry.</p> <p>Historical approach to particulate nature of matter, laws of chemical combination, Dalton’s atomic theory: concept of elements, atoms and molecules.</p> <p>Atomic and molecular masses. Mole concept and molar mass; percentage composition and empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry</p> <p>Structure of Atom</p> <p>Discovery of electron, proton and neutron; atomic number, isotopes and isobars. Thompson’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 exclusion principle and Hund’s rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.</p> <p>Classification of Elements and Periodicity in Properties</p> <p>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, valence. Nomenclature of elements with atomic number greater than 100</p>	<p>Sets</p> <p>Sets and their representations. Empty set. Finite and Infinite sets. Equal sets. Subsets. Subsets of the set of real numbers especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and intersection of sets. Difference of sets. Complement of a set, Properties of Complement sets.</p> <p>Relations and Functions</p> <p>Ordered pairs, Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the reals with itself (upto <math>\mathbb{R} \times \mathbb{R}</math>).</p> <p>Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain and range of a function. Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions.</p> <p>Trigonometric Functions</p> <p>Positive and negative angles. Measuring angles in radians and in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity <math>\sin^2x + \cos^2x = 1</math>, for all x. Signs of trigonometric functions and sketch of their graphs. Expressing <math>\sin (x+ y)</math> and <math>\cos (x + y)</math> in terms of <math>\sin x</math>, <math>\sin y</math>, <math>\cos x</math> and <math>\cos y</math>. Deducing the identities like following:</p> <p><math>\tan (x + y) \tan x \tan y</math> , <math>\cot (xy)</math></p> <p><math>\cot x \cot y</math></p> <p><math>1 \tan x \tan y</math></p> <p><math>\cot y \cot x</math></p>					
2	II	Work, Energy, and Power	Chemical Bonding and Molecular Structure, States of Matter, Thermodynamics	Complex Numbers and Quadratic Equations, Linear Inequalities	ConcepTest-2	180	720	13-Dec	20-Dec

		<p>Work, Energy and Power</p> <p>Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.</p> <p>Notion of potential energy, potential energy of a spring, conservative forces; conservation of mechanical energy (kinetic and potential energies); non-conservative forces; motion in a vertical circle, elastic and inelastic collisions in one and two dimensions</p>	<p>Chemical Bonding and Molecular Structure</p> <p>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.</p> <p>States of Matter: Gases and Liquids</p> <p>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's law, Gay Lussac's law, Avogadro's law, ideal behaviour, empirical derivation of gas equation, Avogadro number, ideal gas equation. Kinetic energy and molecular speeds (elementary idea), deviation from ideal behaviour, liquefaction of gases, critical temperature.</p> <p>Liquid State – Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).</p> <p>Thermodynamics</p> <p>Concepts of system, types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions.</p> <p>First law of thermodynamics – internal energy and enthalpy, heat capacity and specific heat, measurement of U and H, Hess's law of constant heat summation, enthalpy of : bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Introduction of entropy as a state function, Second law of thermodynamics, Gibbs energy change for spontaneous and non-spontaneous process, criteria for equilibrium.</p> <p>Third law of thermodynamics – Brief introduction.</p>	<p>Complex Numbers and Quadratic Equations</p> <p>Need for complex numbers, especially 1, to be motivated by inability to solve every quadratic equation. Brief description of algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system, Square-root of a Complex number</p> <p>Linear Inequalities</p> <p>Linear inequalities, Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables - graphically</p>					
3	III	<p><b>Motion of System of Particles and Rigid Body, &amp; Gravitation</b></p>	<p><b>Redox Reactions, Hydrogen</b></p>	<p><b>Permutations and Combinations, Binomial Theorem, Sequences and Series</b></p>	ConcepTest-3	180	720	20-Dec	27-Dec
		<p>Centre of mass of a two-particle system, momentum conservation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod. Moment of a force, torque, angular momentum, conservation of angular momentum with some examples.</p> <p>Equilibrium of rigid bodies, rigid body rotation and equation of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration. Values of M.I. for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.</p> <p>: Gravitation</p> <p>Kepler's laws of planetary motion. The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy; gravitational potential. Escape velocity, orbital velocity of a satellite. Geostationary satellites.</p>	<p>: Redox Reactions</p> <p>Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions in terms of loss and gain of electron and change in oxidation numbers, applications of redox reactions.</p> <p>Hydrogen</p> <p>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, use and structure; hydrogen as a fuel.</p>	<p>Permutations and Combinations</p> <p>Fundamental principle of counting. Factorial n. Permutations and combinations derivation of formulae and their connections, simple applications.</p> <p>Binomial Theorem</p> <p>History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, general and middle term in binomial expansion, simple applications.</p> <p>Sequence and Series</p> <p>Sequence and Series. Arithmetic Progression (A.P.), Arithmetic Mean (A.M.), Geometric Progression (G.P.), general term of a G.P., sum of n terms of a G.P. Arithmetic and geometric series, infinite G.P. and its sum, geometric mean (G.M.). Relation between A.M. and G.M. Sum</p> <p>to n terms of the special series :</p> <p><math>n, n^2</math> and <math>n^3</math></p>					
4		<b>Unit-I, II, &amp; III</b>	<b>Unit-I, II, &amp; III</b>	<b>Unit-I, II, &amp; III</b>	<b>AatmaManthan-1</b>	180	720	20-Dec	27-Dec
5	IV	<p><b>Properties of bulk matter and Thermodynamics</b></p>	<p><b>The s- and p- block Elements</b></p>	<p><b>Straight Lines, Conic Sections, Three Dimensional Geometry</b></p>	ConcepTest-4	180	720	27-Dec	03-Jan

		<p>: Properties of Bulk Matter</p> <p>Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, poisson's ratio; elastic energy. Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes).</p> <p>Effect of gravity on fluid pressure.</p> <p>Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow. Critical velocity, Bernoulli's theorem and its applications. Surface energy and surface tension, angle of contact, excess of pressure, application of surface tension ideas to drops, bubbles and capillary rise. Heat, temperature, thermal expansion; thermal expansion of solids, liquids, and gases. Anomalous expansion. Specific heat capacity: Cp, Cv – calorimetry; change of state – latent heat.</p> <p>Heat transfer – conduction and thermal conductivity, convection and radiation. Qualitative ideas of Black Body Radiation, Wein's displacement law, and Green House effect.</p> <p>Newton's law of cooling and Stefan's law</p> <p>Thermodynamics</p> <p>Thermal equilibrium and definition of temperature (zeroth law of Thermodynamics). Heat, work and internal energy. First law of thermodynamics. Isothermal and adiabatic processes.</p> <p>Second law of thermodynamics: Reversible and irreversible processes. Heat engines and refrigerators</p>	<p>: s- Block Elements (Alkali and Alkaline earth metals)</p> <p>Group 1 and Group 2 elements:</p> <p>General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses.</p> <p>Preparation and Properties of Some Important Compounds:</p> <p>Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogencarbonate, biological importance of sodium and potassium. CaO, CaCO<sub>3</sub>, and industrial use of lime and limestone, biological importance of Mg and Ca</p> <p>Some p-Block Elements</p> <p>General Introduction to p-Block Elements</p> <p>Group 13 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group; Boron- physical and chemical properties, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalies</p> <p>Group 14 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first element. Carbon - catenation, allotropic forms, physical and chemical properties; uses of some important compounds: oxides. Important compounds of silicon and a few uses : silicon tetrachloride, silicones, silicates and zeolites, their uses.</p>	<p>COORDINATE GEOMETRY</p> <p>Straight Lines</p> <p>Brief recall of 2-D from earlier classes, shifting of origin. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two-point form, intercepts form and normal form. General equation of a line. Equation of family of lines passing through the point of intersection of two lines. Distance of a point from a line.</p> <p>Sections of a cone: Circles, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.</p> <p>Introduction to Three-dimensional Geometry</p> <p>Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula</p>						
6	V	Behaviour of Perfect Gas and Kinetic Theory, Oscillations, & waves	Organic Chemistry – Some Basic Principles and Techniques, Hydrocarbons	Limits and Derivatives, Mathematical Reasoning,	ConcepTest-5	180	720	03-Jan	10-Jan	
		<p>Behaviour of Perfect Gas and Kinetic Theory</p> <p>Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases: Assumptions, concept of pressure. Kinetic energy and temperature; rms speed of gas molecules; degrees of freedom, law of equipartition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number</p> <p>: Oscillations and Waves</p> <p>Periodic motion – period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (SHM) and its equation; phase; oscillations of a spring – restoring force and force constant; energy in SHM – kinetic and potential energies; simple pendulum – derivation of expression for its time period; free, forced and damped oscillations (qualitative ideas only), resonance.</p> <p>Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics. Beats. Doppler effect.</p>	<p>Organic Chemistry – Some Basic Principles and Techniques</p> <p>General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyper conjugation.</p> <p>Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions; electrophiles and nucleophiles, types of organic reactions</p> <p>Hydrocarbons</p> <p>Classification of Hydrocarbons. Aliphatic Hydrocarbons:</p> <p>Alkanes – Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.</p> <p>Alkenes – Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation; chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.</p> <p>Alkynes – Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water. Aromatic hydrocarbons – Introduction, IUPAC nomenclature; Benzene: resonance, aromaticity ; chemical properties: mechanism of electrophilic substitution – nitration sulphonation, halogenation, Friedel Craft's alkylation and acylation; directive influence of functional group in mono-substituted benzene; carcinogenicity and toxicity.</p>	<p>CALCULUS</p> <p>Limits and Derivatives</p> <p>Derivative introduced as rate of change both as that of distance function and geometrically,</p> <p><math>\log (1x) \text{ } e x1</math></p> <p>intuitive idea of limit. <math>\lim e</math>, <math>\lim</math>. Definition of derivative, relate it to slope</p> <p><math>x \quad 0xx \quad 0x</math></p> <p>of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions</p> <p>MATHEMATICAL REASONING</p> <p>Mathematically acceptable statements. Connecting words/phrases - consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words - difference between contradiction, converse and contrapositive.</p>						
7		Unit-I, II, III, IV & V	Unit-I, II, III, IV & V	Unit-I, II, III, IV & V	AatmaManthan-2	180	720	03-Jan	10-Jan	
8	VI	Electrostatics & Current Electricity	The Solid State, Solutions, Electro Chemistry. Chemical Kinetics, surface chemistry	Matrices & Deteminants, Continuity and Differentiability	ConcepTest-6	180	720	10-Jan	17-Jan	

			<p>Electrostatics</p> <p>Electric charges and their conservation. Coulomb's law – force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution.</p> <p>Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in a uniform electric field.</p> <p>Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside).</p> <p>Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipoles in an electrostatic field.</p> <p>Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor, Van de Graaff generator</p> <p>Current Electricity</p> <p>Electric current, flow of electric charges in a metallic conductor, drift velocity and mobility, and their relation with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity.</p> <p>Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; temperature dependence of resistance.</p> <p>Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel.</p> <p>Kirchhoff's laws and simple applications. Wheatstone bridge, metre bridge. Potentiometer – principle and applications to measure potential difference, and for comparing emf of two cells; measurement of internal resistance of a cell.</p>	<p>Solid State</p> <p>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 dimensionallattices, calculation of density of unit cell, packing in solids, packing efficiency, voids ,number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals ,conductors, semiconductors and insulators and n and p type semiconductors</p> <p>Solutions</p> <p>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 B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant Hoff factor</p> <p>Electrochemistry</p> <p>Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws 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.</p> <p>Chemical Kinetics</p> <p>Rate of a reaction (average and instantaneous), factors affecting rates 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.</p> <p>: Surface Chemistry</p> <p>Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis</p> <p>:homogenousand heterogeneous, activity and selectivity: enzyme catalysis; colloidalstate: distinction between true solutions, colloids and suspensions;</p>	<p>Matrices</p> <p>Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2).</p> <p>Concept of elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).</p> <p>Determinants</p> <p>Determinant of a square matrix (up to <math>3 \times 3</math> matrices), properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.</p> <p>Continuity and Differentiability</p> <p>Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Conceptsof exponential, logarithmic functions. Derivatives of <math>\log x</math> and <math>e^x</math>. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretations</p>					
9	VII		<p>Magnetic Effects of Current and Magnetism, Electromagnetic Induction and Alternating Currents</p>	<p>General Principles and Processes of Isolation of Elements, d- and f- block elements</p>	<p>Indefinite &amp; Definite Integrals</p>	ConcepTest-7	180	720	10-Jan	17-Jan
			<p>Magnetic Effects of Current and Magnetism</p> <p>Concept of magnetic field, Oersted's experiment. Biot - Savart law and its application to current carrying circular loop.</p> <p>Ampere's law and its applications to infinitely long straight wire, straight and toroidal solenoids. Force on a moving charge in uniform magnetic and electric fields. Cyclotron.</p> <p>Force on a current-carrying conductor in a uniformmagnetic field. Force between two parallel current- carrying conductors – definition of ampere. Torque experienced by a current loop in a magnetic field; moving coil galvanometer – its current sensitivity and conversion to ammeter and voltmeter.</p> <p>Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements.</p> <p>Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths. Permanent magnets.</p> <p>Electromagnetic Induction and Alternating Currents</p> <p>Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance.</p> <p>Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current. AC generator and transformer</p>	<p>Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.</p> <p>: p-Block Elements</p> <p>Group 15 elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen – preparation, properties and uses; compounds of nitrogen: preparation and properties of ammonia and nitric acid, oxides of nitrogen ( structure only); Phosphorous-allotropic forms; compounds of phosphorous: preparation and properties of phosphine</p> <p>,halides (PCl3, PCl5) and oxoacids (elementary idea only).</p> <p>Group 16 elements : General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; classification of oxides; ozone. Sulphur – allotropic forms; compounds of sulphur: preparation, properties and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).</p> <p>Group 17 elements : General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds, oxoacids of halogens (structures only).</p> <p>Group 18 elements: General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.</p> <p>d and f Block Elements</p> <p>General introduction ,electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation . Preparation and properties of K2Cr2O7 and KMnO4.</p> <p>Lanthanoids – electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.</p> <p>Actinoids – Electronic configuration, oxidation states and comparison with lanthanoids .</p>	<p>Integrals</p> <p>Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type –</p> <p>.....</p> <p>to be evaluated.</p> <p>dx ,</p> <p>dx</p> <p>a n d</p> <p>pxq</p> <p>dx ,</p>					
10	VIII		<p>Electromagnetic Waves &amp; Optics</p>	<p>Coordination Compounds, Haloalkanes and Haloarenes, Alcohols, Phenols and Ethers</p>	<p>Differential Equations</p>	ConcepTest-8	180	720	17-Jan	24-Jan

		<p>Electromagnetic Waves Need for displacement current. Electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays) including elementary facts about their uses. Optics Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, combination of thin lenses in contact combination of a lens and a mirror. Refraction and dispersion of light through a prism. Scattering of light – blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Optical instruments: Human eye, image formation and accommodation, correction of eye defects (myopia and hypermetropia) using lenses. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. Wave optics: Wavefront and Huygens' principle, reflection and refraction of plane wave at a plane surface using wavefronts. Proof of laws of reflection and refraction using Huygens' principle. Interference, Young's double hole experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes. Polarisation, plane polarised light; Brewster's law, uses of plane polarised light and Polaroids</p>	<p>Coordination Compounds Coordination compounds : Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, bonding, Werner's theory VBT,CFT; isomerism (structural and stereo) importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems). Haloalkanes and Haloarenes Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions. Optical rotation. Haloarenes: Nature of C-X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only). Uses and environmental effects of – dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT. Alcohols, Phenols and Ethers Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols; mechanism of dehydration, uses, with special reference to methanol and ethanol. Phenols : Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols. Ethers : Nomenclature, methods of preparation, physical and chemical properties, uses</p>	<p>Differential Equations Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type – <math>\frac{dy}{dx} + Py = Q</math>, where P and Q are functions of x or constant <math>\frac{dx}{dy} + Px = Q</math>, where P and Q are functions of y or constant</p>					
11		Unit-VI, VII, & VIII	Unit-VI, VII, & VIII	Unit-VI, VII, & VIII	AatmaManthan-3	180	720	17-Jan	24-Jan
12	IX	Dual Nature of Matter and Radiation, Atoms & Nuclei	Amines, Biomolecules, Polymers	Vectors, Linear Programming	ConcepTest-9	180	720	24-Jan	31-Jan
		<p>Dual Nature of Matter and Radiation Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation – particle nature of light. Matter waves – wave nature of particles, de Broglie relation. Davisson-Germer experiment (experimental details should be omitted; only conclusion should be explained.) : Atoms and Nuclei Alpha – particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity – alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.</p>	<p>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 – will be mentioned at relevant places in context. Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry. Biomolecules Carbohydrates – Classification (aldoses and ketoses), monosaccharide (glucose and fructose), D-L configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen): importance. Proteins - Elementary idea of a - amino acids, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes. Hormones –Elementary idea (excluding structure). Vitamins – Classification and functions. Nucleic Acids: DNA and RNA Polymers 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 non-biodegradable polymers</p>	<p>Vectors Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors, scalar triple product Linear Programming Introduction, related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).</p>					
13	X	Electronic Devices & Communication Systems	Environmental Chemistry, Chemistry in Everyday Life	Statistics, Probability	ConcepTest-10	180	720	31-Jan	07-Feb

		<p><b>Electronic Devices</b></p> <p>Energy bands in solids (qualitative ideas only), conductors, insulators and semiconductors; semiconductor diode – I-V characteristics in forward and reverse bias, diode as a rectifier; I-V characteristics of LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch</p> <p><b>Communication Systems</b></p> <p>Elements of a communication system (block diagram only); bandwidth of signals (speech, TV and digital data); bandwidth of transmission medium. Propagation of electromagnetic waves in the atmosphere, sky and space wave propagation. Need for modulation. Production and detection of an amplitude-modulated wave.</p>	<p><b>Chemistry in Everyday Life</b></p> <p>1. Chemicals in medicines – analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.</p> <p>2. Chemicals in food – preservatives, artificial sweetening agents, elementary idea of antioxidants.</p> <p>3. Cleansing agents – soaps and detergents, cleansing action</p>	<p><b>TATISTICS AND PROBABILITY</b></p> <p>Statistics</p> <p>Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances.</p> <p>Probability</p> <p>Random experiments: outcomes, sample spaces (set representation). Events: Occurrence of events, 'not', 'and' &amp; 'or' events, exhaustive events, mutually exclusive events. Axiomatic (set theoretic) probability, connections with the theories of earlier classes. Probability of an event, probability of 'not', 'and', &amp; 'or' events.</p>					
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14		Unit-VI, VII, & VIII, IX, & X	Unit-VI, VII, & VIII, IX, & X	Unit-VI, VII, & VIII, IX, & X	AatmaManthan-4	180	720	31-Jan	07-Feb
15		Unit-I, II, III, VI & VII	Unit-I, II, III, VI & VII	Unit-I, II, III, VI & VII	AatmaManthan-5	180	720	07-Feb	14-Feb
16		Unit-IV, V, VIII, IX, & X	Unit-IV, V, VIII, IX, & X	Unit-IV, V, VIII, IX, & X	AatmaManthan-6	180	720	07-Feb	14-Feb
17		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-1	180	720	14-Feb	21-Feb
18		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-2	180	720	21-Feb	28-Feb
19		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-3	180	720	28-Feb	07-Mar
20		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-4	180	720	07-Mar	14-Mar
21		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-5	180	720	14-Mar	22-Mar
22		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-6	180	720	22-Mar	29-Mar
23		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-7	180	720	29-Mar	05-Apr
24		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-8	180	720	05-Apr	12-Apr
25		Full Syllabus	Full Syllabus	Full Syllabus	AatmaGyan-9	180	720	12-Apr	20-Apr