

Syllabus

MATHEMATICS

UNIT-I

I SETS AND FUNCTIONS

1. Sets:

Sets and their representations, Empty set. Finite & 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.

2. Relations and Functions:

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 $\mathbb{R} \times \mathbb{R} \times \mathbb{R}$). Definition of relation, pictorial diagrams, domain. Codomain 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 & 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.

3. Trigonometric Functions:

Positive and negative angles. Measuring angles in radians & in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity $\sin^2 x + \cos^2 x = 1$, for all x . Signs of trigonometric functions and sketch of their graphs. Expression $\sin(x+y)$ and $\cos(x+y)$ in terms of $\sin x$, $\sin y$, $\cos x$ & $\cos y$. Deducing the identities like following:

$$\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}, \cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x},$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}, \cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2},$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}, \cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$$

Identities related to $\sin 2x$, $\cos 2x$, $\tan 2x$, $\sin 3x$, $\cos 3x$ and $\tan 3x$. General solution of trigonometric equations of the type $\sin \theta = \sin \alpha$, $\cos \theta = \cos \alpha$ and $\tan \theta = \tan \alpha$.

II ALGEBRA

1. Principle of Mathematical Induction:

Processes of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

2. Complex Numbers and Quadratic Equations:

Need for complex numbers, especially $\sqrt{-1}$, 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.

3. Linear Inequalities:

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.

4. Permutations and Combinations:

Fundamental principle of counting, Factorial n . $(n!)$ Permutation and combinations, derivation of formulae and their connections, simple applications.

5. Binomial Theorem:

History, statement and proof of the binomial theorem for positive integral indices, Pascal's triangle, general and middle term in binomial expansion, simple applications.

6. Sequences and Series:

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., geometric mean (G.M.), relation between A.M. and G.M. Sum to n terms of the special series $\sum n$, $\sum n^2$ and $\sum n^3$.

III COORDINATE GEOMETRY

1. Straight Lines:

Brief recall of 2D from earlier classes. 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. Distance of a point from a line.

2. Conic Sections:

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.

3. Introduction to Three – dimensional Geometry:

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula.

IV CALCULUS

1. Limits and Derivatives:

Derivative introduced as rate of change both as that of distance function and geometrically, intuitive, idea of limit. Definition of derivative, relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions.

Derivatives of polynomial and trigonometric functions.

V. MATHEMATICAL REASONING

1. Mathematical Reasoning:

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.

VI. STATISTICS & PROBABILITY

1. Statistics:

Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances.

2. Probability:

Random experiments: outcomes, sample spaces (set representation). Events: occurrence of events, ‘not’, ‘and’ and ‘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’ & ‘or’ events.

UNIT-II

MATHEMATICS

I RELATIONS AND FUNCTIONS

1. Relations and Functions:

Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function. Binary operations.

2. Inverse Trigonometric Functions:

Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

II ALGEBRA

1. Matrices:

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). Concept of elementary row and column operation. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

2. Determinants:

Determinant of a square matrix (up to 3×3 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 solution) using inverse of a matrix.

III CALCULUS

1. Continuity and Differentiability:

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Concept of exponential and logarithmic functions and their derivative. 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.

2. Applications of Derivatives:

Application of derivatives: rate of change, increasing/decreasing functions, tangents & normals, approximation, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals:

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

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \frac{dx}{ax^2 + bx + c}$$

$$\int \frac{(px + q)}{ax^2 + bx + c} dx, \int \frac{(px + q)}{\sqrt{ax^2 + bx + c}} dx, \int \sqrt{a^2 \pm x^2} dx \text{ and } \int \sqrt{x^2 - a^2} dx$$

to be evaluated.

Definite integrals as a limit of a sum, Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. Applications of the Integrals:

Applications in finding the area under simple curves, especially lines, areas of circles/parabolas/ellipses (in standard form only), area between the two above said curves (the region should be clearly identifiable).

5. 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 variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type:

$$\frac{dy}{dx} + py = q, \text{ where } p \text{ and } q \text{ are functions of } x$$

IV VECTORS AND THREE-DIMENSIONAL GEOMETRY

1. 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.

2. Three – dimensional Geometry:

Direction cosines/ratios of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes. (iii) a line and a plane. Distance of a point from a plane.

V LINEAR PROGRAMMING

1. Linear Programming:

Introduction, definition of related terminology such as constraints, objective function, optimisation, 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, optional feasible solutions (up to three non-trivial constraints).

VI PROBABILITY

1. Probability:

Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem, Random variable and its probability distribution, mean and variance of haphazard variable. Repeated independent (Bernoulli) trials and Binomial distribution.

PHYSICS

UNIT- I

1. Physical World and Measurement

Physics-scope and excitement; nature of physical laws; Physics, technology and society 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.

Dimensions of physical quantities, dimensional analysis and its applications.

2. Kinematics

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 position-time graphs, relations for uniformly accelerated motion (graphical treatment).

Elementary concepts of differentiation and integration for describing motion.

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.

Unit vector; Resolution of a vector in a plane – rectangular components. Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

3. Laws of Motion

Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications.

Equilibrium of concurrent forces. Static and Kinetic friction, laws of friction, rolling friction.

Dynamics of uniform circular motion; Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road)

4. Work, Energy and Power

Scalar product of vectors. Work done by a constant force and a variable force; Kinetic energy, work energy theorem, power.

Notion of Potential energy, potential energy of a spring, conservative forces; conservation of mechanical energy (Kinetic and potential energies), Non-conservative forces; elastic and inelastic collisions in one and two dimensions.

5. Motion of System of Particles and Rigid Body

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.

Vector product of vectors; moment of a force, torque, angular momentum, conservation of angular momentum with some examples.

Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions; Moment of inertia, radius of gyration.

Values of moments of inertia for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.

6. Gravitation

Keplar'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. Geo-stationary satellites.

7. Properties of Bulk Matter

Elastic behaviour, Stress-strain relationship, Hooke's Law, Young's modulus, bulk modulus, shear, modulus of rigidity.

Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure.

Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow. Bernoulli's theorem and its applications.

Surface energy and surface tension, angle of contact, application of surface tension ideas to drops, bubbles and capillary rise.

Heat, temperature, thermal expansion; specific heat – calorimetry; change of state – latent heat.

Heat transfer – conduction, convection and radiation, thermal conductivity, Newton's law of cooling.

8. Thermodynamics

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics), Heat, work and internal energy. First law of thermodynamics.

Second law of thermodynamics: reversible and irreversible processes. Heat engines and refrigerators.

9. Behaviour of Prefect Gas and Kinetic Theory

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 heats of gases; concept of mean free path, Avogadro's number

10. Oscillations and Waves

Periodic motion – period, frequency, displacement as a function of time. Periodic function. Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring- restoring force and force constant; energy in S.H.M.- Kinetic and potential energies; simple pendulum – derivation of expression for its time period; free, forced and damped oscillations (qualitative ideas only), resonance.

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.

1. Electrostatics

Electric Charges; Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution.

Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in uniform electric field.

Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside).

Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field.

Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric 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.

2. Current Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity, 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. Carbon resistors, colour code for carbon resistors; series and parallel combination of resistors; temperature dependence of resistance.

Internal resistance of a cell, Potential difference and emf of a cell, combination of cells in series and in parallel.

Kirchoff's laws and simple applications. wheatstone bridge, metre bridge.

Potentiometer – principle and its applications to measure potential difference and for comparing emf of two cells; measurement of internal resistance of a cell.

3. Magnetic Effects of Current and Magnetism

Concept of Magnetic field, Oersted's experiment.

Bio – Savart law and its applications to current carrying circular loop.

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.

Force on a current-carrying conductor in a uniform magnetic field. Force between two parallel current-carrying conductors-definition of ampere. Torque experienced by a current loop in uniform magnetic field; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter. 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. Para-, dia-and ferro – magnetic substances, with examples.

Electromagnets and factor affecting their strengths. Permanent magnets.

4. Electromagnetic Induction and Alternating currents

Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance.

Need for displacement current.

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.

5. Electromagnetic waves

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.

6. 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. 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, Hypermetropia, presbyopia and astigmatism) using lenses. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers.

Wave optics; wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens' principle. Interference, Young's double slit 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.

7. Dual Nature of Matter and Radiation

Dual nature of 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.

8. Atoms & 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.

9. Electronic Devices

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.

10. Communication Systems

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.

CHEMISTRY

UNIT- I

1. Some Basic Concepts of Chemistry

General Introduction: Importance and scope of Chemistry.

Historical approach to particulate nature of matter, laws of chemical combination. Dalton's atomic theory: concept of elements, atoms and molecules.

Atomic and molecular masses. Mole concept and molar mass: percentage composition, empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry.

2. Structure of Atom

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

3. Classification of Elements and Periodicity in Properties

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements – atomic radii, ionic radii. Ionization enthalpy, electron gain enthalpy, electro negativity, valence.

4. Chemical Bonding and Molecular Structure

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

5. States of Matter: gases and liquids

Three states of matter. Intermolecular interactions, type 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. Derivation from ideal behaviour, liquefaction of gases, critical temperature.

Liquid State – Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).

6. Thermodynamics

Concepts Of System, 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 transformation, ionization, and solution.

Introduction of entropy as a state function, free energy change for spontaneous and non-spontaneous processes, criteria for equilibrium.

7. 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, concept of pH. Hydrolysis of salts (elementary idea). Buffer solutions, solubility product, common ion effect (with illustrative examples).

8. Redox Reactions

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, applications of redox reactions.

9. Hydrogen

Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen; hydrides – ionic, covalent and interstitial; physical and chemical properties of water, heavy water; hydrogen peroxide-preparation, properties and structure; hydrogen as a fuel.

10 s-Block Elements (Alkali and Alkaline earth metals)

Group 1 and Group 2 elements:

General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionisation enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses.

Preparation and properties of some important compounds:

Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate, biological importance of sodium and potassium.

CaO , CaCO_3 and industrial use of lime and limestone, biological importance of Mg and Ca

11. Some p-Block Elements

General Introduction to p-Block Elements

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 alkalis.

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.

12. Organic Chemistry – Some Basic Principles and Techniques

General introduction, method, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds.

Electronic displacements in a covalent bond: inductive effect, electromeric effect,

resonance and hyper conjugation.

Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions; electrophiles and nucleophiles, types of organic reactions.

13. Hydrocarbons

Classification of Hydrocarbons

Alkanes – Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including, free radical mechanism or halogenation, combustion and pyrolysis.

Alkenes – Nomenclature, structure of double bond (ethene) geometrical isomerism, physical properties, methods of preparation; chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.

Alkynes – Nomenclature, structure of triple bond (ethyne), physical properties. Methods of preparation, chemical reactions; acidic character of alkynes, addition reaction of – hydrogen, halogens, hydrogen halides and water.

Aromatic hydrocarbons: Introduction, IUPAC nomenclature; Benzene: resonance aromaticity; chemical properties: mechanism of electrophilic substitution. – nitration sulphonation, halogenation, Friedel Craft's alkylation and acylation: directive influence of functional group in mono-substituted benzene; carcinogenicity and toxicity.

14. Environmental Chemistry

Environmental pollution – air, water and soil pollution, chemical reactions in atmosphere, smog, major atmospheric pollutants; acid rain, ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming – pollution due to industrial wastes; green chemistry as an alternative tool for reduction pollution, strategy for control of environmental Pollution.

UNIT-II

CHEMISTRY

1. Solid State

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, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties.

2. Solutions

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, elevation of Boiling Point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass.

3. Electrochemistry

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, fuel cells; corrosion.

4. Chemical Kinetics

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)

5. Surface Chemistry

Adsorption – physisorption and chemisorption; factor affecting adsorption of gases on solids; catalysis : homogenous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophilic, lyophobic, multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsion – types of emulsions.

6. General Principles and Processes of Isolation of Elements

Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and Iron.

7. p-Block Elements

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, halides (PCl_3 , PCl_5) and oxoacids (elementary idea only).

Group 16 elements: General introduction, electronic configuration, oxidation states,

occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; simple 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).

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)

Group 18 elements: General introduction, electronic configuration. Occurrence, trends in physical and chemical properties, uses.

8. d and f Block Elements

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionisation enthalpy, oxidation states, ionic radii, colour catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$.

Lanthanoids – electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction.

Actinoids – Electronic configuration, oxidation states.

9. Coordination Compounds

Coordination compounds – Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding; isomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems).

10. Haloalkanes and Haloarenes

Haloalkanes:

Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions.

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.

11. 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 of 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.

12. Aldehydes, Ketones and Carboxylic Acids

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

Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and

chemical properties; uses.

13. 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.

14. Biomolecules

Carbohydrates – Classification (aldoses and ketoses), monosaccharides (glucose and fructose), oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); importance.

Proteins - Elementary idea of α - amino acids, peptide bond, polypeptides proteins, structure of amines-primary, secondary, tertiary structure and quaternary structures (qualitative idea only),

Vitamins – Classification and functions.

Nucleic Acids: DNA & RNA.

15. Polymers

Classification – natural and synthetics, methods of polymerisation (addition and condensation), copolymerisation. Some important polymers: natural and synthetic like polythene, nylon, polyesters, bakelite, rubber.

16. Chemistry in everyday life:

1. **Chemicals in medicine** – analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.
2. **Chemicals in food** – preservatives, artificial sweetening agents.
3. **Cleansing agents** – soaps and detergents, cleansing action.

BIOLOGY

UNIT – I

1. Diversity in Living World

Diversity of living organisms

Classification of the living organisms (five kingdom classification, major groups and principles of classification within each kingdom).

Systematics and binomial System of nomenclature

Salient features of animal (non-chordates up to phylum level and chordates up to class level) and plant (major groups; Angiosperms up to class) classification, viruses, viroids, lichens, Botanical gardens, herbaria, zoological parks and museums.

2. Structural Organization in Animals and Plants

Tissues in animals and plants.

Morphology, anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence, flower, fruit and seed.

Morphology, anatomy and functions of different systems of an annelid (earthworm), an insect (cockroach) and an amphibian (frog).

3. CELL: STRUCTURE AND FUNCTION

Cell: Cell theory; Prokaryotic and eukaryotic cell, cell wall, cell membrane and cell organelles' (plastids, mitochondria, endoplasmic reticulum, Golgi bodies/dictyosomes, ribosomes, lysosomes, vacuoles, centrioles) and nuclear organization.

Mitosis, meiosis, cell cycle.

Basic chemical constituents of living bodies.

Structure and functions of carbohydrates, proteins, lipids and nucleic acids.

Enzymes: types, properties and function.

4. Plant Physiology

Movement of water, food, nutrients and gases, Plants and Water Mineral nutrition, Respiration, Photosynthesis, Plant growth and development.

5. Human Physiology

Digestion and absorption.

Breathing and respiration.

Body fluids and circulation.

Excretory products and elimination.

Locomotion and movement.

Neural control and coordination,
chemical coordination and regulation.

UNIT – II

BIOLOGY

1. REPRODUCTION

Reproduction in organisms : Asexual and sexual reproduction. Sexual reproduction in flowering plants : Structure of flower, pollination, fertilization, development of seeds and fruits, apomixes and polyembryony.

Human reproduction : Reproductive system in male and female, menstrual cycle, production of gametes, fertilization, implantation, embryo development, pregnancy, parturition and lactation.

Reproductive Health : Population and birth control, contraception and MTP; sexually transmitted diseases, infertility.

2. GENETICS AND EVOLUTION

Mendelian inheritance.

Chromosome theory of inheritance, deviations from Mendelian ratio (gene interaction- incomplete dominance, co-dominance, multiple alleles).

Sex determination in human beings: XX, XY.

Linkage and crossing over.

Inheritance pattern : Mendelian disorders and chromosomal disorders in humans.

DNA and RNA, search for genetic material, replication, transcription, genetic code, translation.

Gene expression and regulation.

Genome and Human Genome Project.

DNA fingerprinting.

Evolution: Origin of life, theories and evidences, adaptive radiation, mechanism of Evolution, origin and evolution of man.

3. BIOLOGY AND HUMAN WELFARE

Basic concepts of immunology, vaccines.

Pathogens, Parasites

Cancer and AIDS

Adolescence and drug / alcohol abuse.

Plant breeding, tissue culture, single cell protein, food production, animal husbandry.

Mircobes in household food processing, industrial production, sewage treatment, energy generation, biocontrol agents and biofertilizers.

4. BIOTECHNOLOGY AND ITS APPLICATION

Principles and Processes; Recombinant DNA technology; Application in Health and Agriculture; genetically modified (GM) organisms; biosafety issues.

5. ECOLOGY & ENVIRONMENT

Ecosystems : components, types, energy flow, nutrient cycling and ecosystem services.

Organism and Population : Organisms and its environment, population and ecological adaptations.

Centres of diversity and conservation for biodiversity, Biosphere reserves, National parks and sancturaries. Environmental issues.

BIOTECHNOLOGY

UNIT- I

1. Introduction to Biotechnology

Fundamentals of Biochemical Engineering; Biotechnology and Society.

2. Biomolecules

[Building Blocks of Biomolecules-Structure and dynamics; Structure and function of Macromolecules. Biochemical Techniques.

3. Cell and Development

The basic unit of life; Cell Growth and development; Cellular Techniques.

4. Genetics and Molecular Biology

Principles of Genetics; Genome Function; Genetical Techniques.

UNIT- II

1. Protein and Gene Manipulation

Protein Structure and Engineering

Introduction to the world of Proteins; 3-D Shape of Proteins; Structure Function Relationship in Proteins; Purification of Proteins; Characterization of Proteins; Protein based products; Designing Proteins; Proteomics.

Recombinant DNA Technology

Introduction; Tools of rDNA Technology, Making Recombinant DNA; DNA Library; Introduction of Recombinant DNA into host cells; Identification of recombinants; Polymerase Chains Reaction (PCR); DNA Probes; Hybridization Techniques; DNA Sequencing; Site-directed mutagenesis

Genomics and Bioinformatics

Introduction; Genome Sequencing Projects; Gene Prediction and counting; Genome similarity, SNP's and comparative genomics; Functional Genomics; History of Bioinformatics; Sequences and Nomenclature; Information Sources; Analysis using Bioinformatics tools.

2. Cell Culture Technology

Microbial Culture and Applications

Introduction; Microbial Culture Techniques; Measurement and Kinetics of microbial Growth; Scale up of microbial process; Isolation of microbial products; Strain isolation and Improvement; Applications of microbial culture technology; Bioethics in microbial technology.

Plant Cell Culture and Applications

Introduction; Cell and Tissue Culture Techniques; Applications of Cell and Tissue Culture; Gene Transfer Methods in Plants; Transgenic Plants with Beneficial Traits; Diagnostics in Agriculture and Molecular Breeding, Bioethics in Plant Genetic Engineering.

Animal Cell Culture and Applications

Introduction; Animal Cell Culture Techniques; Characterization of Cell Lines; Scale-up of Animal Culture Process; applications of Animal Cell Culture; Stem Cell Technology; Bioethics of Genetic Engineering in Animals.

COMPUTER SCIENCE

UNIT- I

1: COMPUTER FUNDAMENTALS

Evolution of computers; Basics of computer and its operation: Functional Components and their interconnections, concept of Booting.

Software Concepts:

Types of Software - System Software, Utility Software and Application Software;
System Software: Operating System, Compilers, Interpreters and Assembler;
Utility Software : Anti Virus, File Management tools, Compression tools and Disk Management tools (Disk Cleanup, Disk Defragmenter, Backup);
Application Software as a tool: Word Processor, Presentation tools, Spreadsheet Package, Database Management System; Business software (for example: School Management System, Inventory Management System, Payroll System, Financial Accounting, Hotel Management, and Reservation System);

Operating System : Need for operating system, Functions of Operating System (Processor Management, Memory Management, File Management and Device Management), Types of operating system – Interactive (GUI based), Time Sharing, Real Time and Distributed; Commonly used operating systems:
LINUX, Windows, BhartiOO, Solaris, UNIX;

2: PROGRAMMING METHODOLOGY

General Concepts; Modular approach; Clarity and Simplicity of Expressions, Use of proper Names for identifiers, Comments, Indentation; Documentation and Program Maintenance;
Running and Debugging programs, Syntax Errors, Run-Time Errors, Logical Errors;

Problem Solving Methodology and Techniques: Understanding of the problem, Identifying minimum number of inputs required for output, Step by step solution for the problem, breaking down solution into simple steps, Identification of arithmetic and logical operations required for solution, Using Control Structure: Conditional control and looping (finite and infinite);

3: INTRODUCTION TO C++

Getting Started:

C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators), Structure of a C++ Program (include files, main function); Header files – iostream.h, iomanip.h; **cout**, **cin**; Use of I/O operators (<< and >>), Use of endl and setw(), Cascading of I/O operators, Error Messages; Use of editor, basic commands of editor, compilation, linking and execution; standard input/output operations from C language: gets(), puts() of stdio.h header file;

Data Types, Variables and Constants:

Concept of Data types; Built-in Data types: **char**, **int**, **float** and **double**; Constants: Integer Constants, Character Constants (Backslash character constants - \n, \t), Floating Point Constants, String Constants; Access modifier: **const**; Variables of built-

in data types, Declaration/ Initialisation of variables, Assignment statement; Type modifier: signed, unsigned, long;

Operators and Expressions:

Operators: Arithmetic operators (-,+,*,/,%), Unary operator (-), Increment and Decrement Operators (—,++), Relational operators (>,>=,<,<=,==,!=), Logical operators (!, &&, ||), Conditional operator: <condition>?<if true>:<else>; Precedence of Operators; Expressions; Automatic type conversion in expressions, Type casting; C++ shorthand's (+=, -=, *=, /=, %=);

4: PROGRAMMING IN C++

Flow of control:

Conditional statements: **if-else**, Nested **if**, **switch..case..default**, Nested **switch..case**, break statement (to be used in switch..case only); Loops: **while**, **do - while** , **for** and Nested loops;

String Functions:

Header File: string.h

Function: **isalnum()**, **isalpha()**, **isdigit()**, **islower()**, **isupper()**, **tolower()**, **toupper()**;

Character Functions:

Header File: ctype.h

Functions: **isalnum()**, **isalpha()**, **isdigit()**, **islower()**, **isupper()**, **tolower()**, **toupper()**, **strcpy()**, **strcat()**, **strlen()**, **strcmp()**, **strcmpi()**;

Mathematical Functions:

Header File-math.h, stdlib.h;

Functions: **fabs()**, **log()**, **log10()**, **pow()**, **sqrt()**, **sin()**, **cos()**, **abs()**,

Other Functions:

Header File- stdlib.h;

Functions: **randomize()**, **random()**;

User Defined Functions:

Defining a function; function prototype, Invoking/calling a function, passing arguments to function, specifying argument data types, default argument, constant argument, call by value, call by reference, returning values from a function, calling functions with arrays, scope rules of functions and variables; local and global variables;

Structured Data Type: Array

Declaration/initialisation of One-dimensional array, Inputting array elements, Accessing array elements, Manipulation of Array elements (sum of elements, product of elements, average of elements, linear search, finding maximum/minimum value); Declaration/Initialization of a String, string manipulations (counting vowels/consonants/digits/ special characters, case conversion, reversing a string, reversing each word of a string);

Two-dimensional Array :

Declaration/initialisation of a two-dimensional array, inputting array elements Accessing array elements, Manipulation of Array elements (sum of row element, column elements, diagonal elements, finding maximum/minimum values);

User-defined Data Types

Need for User defined data type:

Defining a symbol name using typedef keyword and defining a macro using #define directive;

Structures:

Defining a Structure, Declaring structure variables, Accessing structure elements, Passing structure of Functions as value and reference argument/parameter, Function returning structure, Array of structures, passing an array of structure as an argument/ a parameter to a function.

UNIT- II

COMPUTER SCIENCE

1. PROGRAMMING IN C++

REVIEW: C++ covered In Class -XI,

Object Oriented Programming:

Concept of Object Oriented Programming – Data hiding, Data encapsulation, Class and Object, Abstract class and Concrete class, Polymorphism (Implementation of polymorphism using Function overloading as an example in C++); Inheritance, Advantages of Object Oriented Programming over earlier programming methodologies,

Implementation of Object Oriented Programming concepts in C++:

Definition of a class, Members of a class - Data Members and Member Functions (methods), Using Private and Public visibility modes, default visibility mode (private); Member function definition: inside class definition and outside class definition using scope resolution operator (::); Declaration of objects as instances of a class; accessing members from object(s), Array of type class, Objects as function arguments - pass by value and pass by reference;

Constructor and Destructor:

Constructor: Special Characteristics, Declaration and Definition of a constructor, Default Constructor, Overloaded Constructors, Copy Constructor, Constructor with default arguments; Destructor: Special Characteristics, Declaration and definition of destructor;

Inheritance (Extending Classes):

Concept of Inheritance, Base Class, Derived Class, Defining derived classes, protected visibility mode; Single level inheritance, Multilevel inheritance and Multiple inheritance, Privately derived, Publicly derived and Protectedly derived class, accessibility of members from objects and within derived class(es);

Data File Handling:

Need for a data file, Types of data files – Text file and Binary file;

Text File: Basic file operations on text file: Creating/Writing text into file, Reading and manipulation of text from an already existing text File (accessing sequentially);

Binary File: Creation of file, Writing data into file, Searching for required data from file, Appending data to a file, Insertion of data in sorted file, Deletion of data from file, Modification of data in a file;

Implementation of above mentioned data file handling in C++;

Components of C++ to be used with file handling:

Header file: fstream.h; ifstream, ofstream, fstream classes;

Opening a text file in **in**, **out**, and **app** modes;

Using cascading operators for writing text to the file and reading text from the file; **open()**, **get()**, **put()**, **getline()** and **close()** functions; Detecting end-of-file (with or without using **eof()** function);

Opening a binary file using **in**, **out**, and **app** modes;

open(), **read()**, **write()** and **close()** functions; Detecting end-of-file (with or without using **eof()** function); **tellg()**, **tellp()**, **seekg()**, **seekp()** functions

Pointers:

Declaration and Initialization of Pointers; Dynamic memory allocation/deallocation operators:

new, **delete**; Pointers and Arrays: Array of Pointers, Pointer to an array (1 dimensional array), Function returning a pointer, Reference variables and use of alias; Function call by reference. Pointer to structures: Deference operator: *, ->; self referencial structures;

2: DATA STRUCTURES

Arrays:

One and two Dimensional arrays: Sequential allocation and address calculation;

One dimensional array: Traversal, Searching (Linear, Binary Search), Insertion of an element in an array, deletion of an element from an array, Sorting (Insertion, Selection, Bubble sort), concatenation of two linear arrays, merging of two sorted arrays;

Two-dimensional arrays: Traversal, Finding sum/difference of two NxM arrays containing numeric values, Interchanging Row and Column elements in a two dimensional array;

Stack (Array and Linked implementation of Stack):

Operations on Stack (PUSH and POP) and its Implementation in C++, Converting expressions from INFIX to POSTFIX notation and evaluation of Postfix expression;

Queue: (Circular Array and Linked Implementation):

Operations on Queue (Insert and Delete) and its Implementation in C++.

3: DATABASES AND SQL

Database Concepts:

Relational data model: Concept of domain, tuple, relation, key, primary key, alternate key, candidate key;

Relational algebra: Selection, Projection, Union and Cartesian product;

Structured Query Language:

General Concepts: Advantages of using SQL, Data Definition Language and Data Manipulation

Language; Data types: NUMBER, CHARACTER, DATE;

SQL commands:

CREATE TABLE, DROP TABLE, ALTER TABLE, UPDATE...SET..., INSERT, DELETE;

SELECT, DISTINCT, FROM, WHERE, IN, BETWEEN, GROUP BY, HAVING, ORDER BY;
SQL functions: SUM, AVG, COUNT, MAX and MIN;
Note: Implementation of the above mentioned commands could be done on any SQL supported software on one or two tables.

4: BOOLEAN ALGEBRA

Binary-valued Quantities, Boolean Variable, Boolean Constant and Boolean Operators: AND, OR, NOT; Truth Tables; Closure Property, Commutative Law, Associative Law, Identity law, Inverse law, Principle of Duality, Idem potent Law, Distributive Law, Absorption Law, Involution law, DeMorgan's Law and their applications;

Obtaining Sum of Product (SOP) and Product of Sum (POS) form from the Truth Table, Reducing Boolean Expression (SOP and POS) to its minimal form, Use of Karnaugh Map for minimization of Boolean expressions (up to 4 variables);

Basic Logic Gates (NOT, AND, OR, NAND, NOR) and their use in circuits.

5: COMMUNICATION AND OPEN SOURCE CONCEPTS

Evolution of Networking: ARPANET, Internet, Interspace;

Different ways of sending data across the network with reference to switching techniques;

Data Communication terminologies:

Concept of Channel, Baud, Bandwidth (Hz, KHz, MHz) and Data transfer rate (bps, kbps, Mbps, Gbps, Tbps);

Transmission media:

Twisted pair cable, coaxial cable, optical fiber, infrared, radio link, microwave link and satellite link.

Network devices:

Modem, RJ45 connector, Ethernet Card, Hub, Switch, Gateway;

Network Topologies and types:

Bus, Star, Tree; Concepts of LAN, WAN, MAN

Network Protocol:

TCP/IP, File Transfer Protocol (FTP), PPP, Level-Remote Login (Telnet), Internet, Wireless/

Mobile Communication, GSM, CDMA, WLL, 3G, SMS, Voice mail, Application Electronic Mail, Chat, Video Conferencing;

Network Security Concepts:

Threats and prevention from Viruses, Worms, Trojan horse, Spams

Use of Cookies, Protection using Firewall;

India IT Act, Cyber Law, Cyber Crimes, IPR issues, Hacking.

Web Servers;

Hyper Text Markup Language (HTML), extensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; Protocol Address; Website, Web browser, Web Servers; Web Hosting, WEB Scripting – Client side (VB script, Java Script, PHP) and Server side (ASP, JSP, PHP)

Open Source Terminologies:

Open Source Software, Freeware, Shareware, Proprietary software, FLOSS, GNU, FSF, OSI;