

The updated syllabus for Common Entrance Test Session 2008

PART-IV MATHEMATICS Unit I Algebra

- 1) **Sets, Relations and Functions:** **14 Marks**
Sets and their representation, finite and infinite sets, subsets, empty set, and universal set, complement of a set, union and intersection of sets and their algebraic properties including De-Morgans Laws. Difference of sets and symmetric difference of sets. Cartesian product of sets, Relations, Equivalence relations. Function (Mapping). Domain and range of function. Into, onto, one-one and many one functions. Composition of functions.
- 2) Complex number in the form $a+ib$, representation of complex numbers by points in a plane. Argand diagram, algebra of complex numbers. Real and imaginary parts of complex numbers. Modulus and argument (amplitude) of a complex number, complex conjugate. Polar representation of complex numbers Square root of a complex number, cube roots of unity. Triangle inequality.
- 3) Theory of Quadratic Equations Solution of quadratic equation in complex number system, $ax^2 + bx + c = 0$; $a, b, c, \in \mathbb{R}$.
Relation between roots and coefficients, nature of roots of a quadratic equation. Formation of quadratic equation with given roots. Symmetric functions of roots viz, $\alpha^2 \pm \beta^2, 1/\alpha \pm 1/\beta, \alpha^3 \pm \beta^3, 1/\alpha \pm 1/\beta$
- 4) **Sequences and progressions**
Arithmetic progression and geometric progression, nth term, sum of n terms of an A.P, Arithmetic mean, insertion of Arithmetic means between any two given numbers, nth term and sum to n terms and infinite number of terms of a G.P. Insertion of G.M. between any two given numbers. Recurring decimal numbers and G.P. Sum to n terms of special cases viz. $\sum n, \sum n^2, \sum n^3$. Sum of n term and sum of infinite Arithmetic-Geometric series
- 5) **Binomial Theorem:** Expansion of binomial with positive integral index, general and particular terms. Finding middle terms and term independent of x, Expansion of binomial with any index.
- 6) **Permutation and combination:**
Fundamental principals of counting. The factorial notation. Permutation as an arrangement, meaning of $P(n,r)$, meaning of $C(n, r)$. Application of permutation and combination.
- 7) **Exponential and Logarithmic Series:-**
Concept of e as the sum of infinite series, proof of $2 < e < 3$ exponential function e^x as the infinite series $1+x/1!+\dots$ and its graph logarithmic function $\log x$ and its graph. The infinite series for $\log_e(1+X)$ $\log_e(1-X)$
- 8) **Statistics:** Mean deviation for ungrouped data, standard deviation.

Unit II Two dimensional Geometry

07 Marks

- 1) Point- Distance formula, area of a triangle. Condition of collinearity of three points and section formula. Centroid and in center of triangle. Locus and its equation. Slope of line. Intercept of a line on coordinate axes.
- 2) **Straight line;** various forms of equations of a line, intersection of lines. Angle between two lines. Lines parallel and perpendicular to a given line. Condition for concurrency of three lines. Distance of a point from a line and

distance between two parallel lines. Coordinates of orthocentre and circumcentre of a triangle.

- 3) **Pair of straight lines:** Homogeneous equation of second degree in x and y represents a pair of straight lines passing through origin. Angle between pair of lines through origin and condition of parallelism and perpendicularity. Joint equation of angle bisectors. Condition for general second degree equation to represent a pair of lines.
- 4) **Circle:** Standard equation of a circle, general form of the equation of a circle, its center and radius. Equation of circle whose end points of diameter are given. Point of intersection of a line and a circle with center at origin and condition for a line to be tangent to a circle. Length of tangent, equation of tangent to a circle at a given point Equation of family of circles through the intersection of two circles.
- 5) **Conic section:** Equations of parabola, ellipse and hyperbola in standard forms. Condition for a line $y = mx + c$ to be tangent to parabola, ellipse and hyperbola.

Unit III Trigonometry

09 Marks

- 1) Circular functions and their properties
- 2) Application of circular functions of difference and sum of two angles.
Application of sum and product of sines and of cosines of angles.
- 3) Application of sine and cosine rule.
- 4) Trigonometric equations.
- 5) Inverse trigonometric functions - Principle values, properties of inverse trigonometric functions within the principle values viz
 $\sin^{-1}(\sin x) = x$
 $\sin^{-1}(1/x) = \operatorname{Cosec}^{-1} x$, $\sin^{-1} x + \cos^{-1} x = \pi/2$
 $\tan^{-1} x + \tan^{-1} y = \tan^{-1} (x+y)/1-xy$

Unit IV Determinants and Matrices

06 Marks

- 1) Determinants: their expansion, minors and cofactor, properties of determinants.
- 2) Application of determinants in solution of equations up to three variables (Cramer rule), Area of triangle.
- 3) Matrices, definition with examples, types of matrices, equality of matrices, addition and scalar multiplication of matrices and their properties.
- 4) Transpose of a matrix, symmetric and skew symmetric matrices, matrix multiplication.
- 5) Adjoint and inverse of matrices. Solution of simultaneous linear equations up to three variables by matrix inversion method.

Note: *In the treatment up to 3x3 determinants and matrices be considered.*

Unit V Vectors

06 Marks

1. Vectors as directed line segments, magnitude and direction of a vector. Equal, parallel and collinear vectors. Components in two and three dimensions of vectors, Laws of addition. Commutativity and associativity, vector of a point divides a line segment in a given ratio.
2. Scalar(or dot) product of vectors projection of a vector on a line. Vector(cross) product of two vectors. Application of dot and cross product in finding areas of triangle and a parallelogram
3. Scalar triple product and its applications. Co-planarity of three vectors or four points using scalar triple product.
4. Vector Triple product and problems based on the vector triple product

Unit VI Three dimensional Geometry**07 Marks**

1. C-ordinate axes and planes in three dimensional space. Co-ordinate of a point in a space. Distance between two points, section formula, direction cosines and direction ratios of a line joining two points, angle between two lines whose direction ratios are given. Equation of a line through two given points.
2. Vector equation of a line through a point and parallel to a given vector. Vector equation of a line through two points, collinearity of three points coplanar and skew lines, conditions for parallelism and perpendicularity of two lines.
3. Perpendicular distance of a given point from a given line Distance between two parallel lines, shortest distance between two skew lines.
4. Cartesian and vector equation of a plane. Normal and intercept forms of equation of a plane. Equation of a plane passing through a given point and perpendicular to a given vector Equation of plane passing through three points. Angle between two planes and condition for parallelism and perpendicularity.
5. Vector and Cartesian equation of a sphere, its centre and radius.

Unit VII Boolean algebra, probability, limit and continuity of function**06 Marks****1. BOOLEAN ALGEBRA**

Boolean algebra as an algebraic structure, Principle of duality, Boolean function, conditional and by conditional statements, valid arguments, switching circuits, application of Boolean algebra to switching circuits.

2. PROBABILITY.

Random experiments and sample space, events as subsets of sample space, occurrence of an events, sure and impossible events, exhaustive events, algebra of events, probability of an event, theorem on probability ; addition rule, multiplication rule, independent events, finding $P(A \text{ or } B)$, $P(A \text{ an } B)$, random variables, probability distribution of a random variable.

3. Concept of $\lim_{x \rightarrow a^+} f(x)$, $\lim_{x \rightarrow a^-} f(x)$, $\lim_{x \rightarrow a} f(x)$
Fundamental theorems on limits. Evaluation of limits using the following standard results.

$$\lim_{x \rightarrow a} x^n - a^n / x - a = na^{n-1}, \lim_{x \rightarrow 0} \sin x = 0, \lim_{x \rightarrow 0} \cos x = 1, \lim_{x \rightarrow 0} \sin x/x = 1$$

$$\lim_{x \rightarrow 0} \log(1+x) / x = 1, \lim_{x \rightarrow 0} (e^x - 1)/x = 1$$

4. Continuity of a function at a point, sum, product and quotient of continuous functions, continuity of Polynomials, exponential logarithmic and inverse, trigonometric functions.

Unit VIII**07 Marks**

1. Derivative of a function, Relation between continuity and differentiability.

2. Derivative of sum, difference, product and quotient of two or more functions.
3. Derivative of composite, algebraic and trigonometric functions.
4. Derivative of inverse trigonometric functions, logarithmic functions and exponential functions.
5. Derivative of functions expressed in parametric form, chain rule, differentiation by substitution.
6. Applications of derivatives:- increasing and decreasing functions, equations of tangents and normal to a given curve at a given point, maxima and minima (absolute, local) (simple problems only).
7. Rolle's Theorem, Lagrange's Mean Value Theorem with simple applications.
8. Derivative of implicit functions, derivative of second order.

Unit IX

07 Marks

1. Integration as the inverse process of differentiation, Integration by substitution and by parts.
2. Evaluation of definite integrals
3. Properties of definite integrals
4. Application of integrals in finding the area bounded by a curve between two ordinates and x-axis (simple problems). Area between two curves. Order and degree of differential equation.
5. Solution of differential equations by method of variable separable. solution of linear differential equation of first order of type $dy/dx + py = q$ where p and q are constants or functions of x alone, solution of second order differential equations $d^2y/dx^2 = f(x)$.

Unit –X Elementary statistics and dynamics

06 Marks

1) Elementary Statistics

1. Introduction, basic concepts and basic laws of mechanics, force, resultant of forces acting at a point, parallelogram law of forces, resolved parts of a force,
2. Equilibrium of a particle under three concurrent forces, triangle law of forces and its converse, Lami's theorem and its converse, two parallel forces, like and unlike parallel forces, couple and its moment.

2) Elementary Dynamics

1. Basic concepts – displacement, speed and velocity, average speed, instantaneous speed, acceleration and retardation, resultant of two velocities.
2. Motion of a particle along a line when moving with constant acceleration, motion of a particle under gravity.
3. Projectile motion – the path of a projectile, its horizontal range, velocity at any instant, greatest height and time of flight.

Syllabus for Common Entrance Test (J&K)

BIOLOGY

BOTANY

Unit I: Diversity of Life, and Plant Classification: (6)

Variety of living organisms; systematics; need, history and types of classifications (artificial, natural, phylogenetic); biosystematics; binomial nomenclature; two kingdom system, Five Kingdom system, their merits and demerits (Detailed study); study of Bacteria and Virus, Botanical gardens and Herbaria; Zoological parks and Museums.

Unit II: Morphology of Plants and Genetics. (6)

Morphology Root, Stem and Leaf, their structure and modifications, inflorescence; flower, fruit, seed and their types, Description Poaceae, Liliaceae, Fabaceae, Solanaceae, Brassicaceae and Asteraceae, Internal structure of plants - - - tissues (Meristematic and permanent; tissue system, anatomy of root, stem and leaf of Monocot and Dicot; secondary growth.

Continuity of Life - - - Heredity, variation ; Mendel's laws of inheritance; Chromosomal basis of inheritance; other patterns of inheritance - - - incomplete dominance, multiple allelism, quantitative inheritance and Pleiotropy.

Unit III: Reproduction, Development and growth of plants (8)

Modes of reproduction in flowering plants - - - vegetative propagation (natural and artificial), significance of vegetative reproduction, micro-propagation; sexual reproduction – development of male and female gametophytes; pollination (types and factors); double fertilization, incompatibility, embryo development , parthenogenesis and parthenocarpy, Characteristics of Plant growth; growth regulators (phytohormones) - - - Auxins - - gibberellins, Cytokinins ethylene, ABA; seed germination - - - mechanism and factors affecting germination, role of growth regulators in seed dormancy ; senescence; abscission, stress factors (salt and water) and growth, plant movement - - -geotropism, phototropism, turgor growth movements (tropic, nastic and nutation), process of flowering - - - photoperiodism, vernalisation.

Unit IV: Physiology of Plants (9)

Cell as a physiological unit; composition of protoplasm; water relations - - - absorption and movement (diffusion, osmosis, plasmolysis, permeability,

water potential, imbibition); theories of water translocation –root pressure, transpiration pull, transpiration---significance, factors affecting rate of transpiration, mechanism of stomatal opening and closing (Potassium ion theory); factor affecting stomatal movement.

Mineral nutrition ---functions of minerals, essential major elements and trace elements; deficiency symptoms of elements, theories of translocation; translocation of solutes, nitrogen and nitrogen metabolism with emphasis on biological nitrogen fixation.

Photosynthesis - -significance, site of photosynthesis (functional aspect of chlorophyll structure); photochemical and photosynthetic phases electron transport system; photophosphorylation (cyclic and non cyclic); C3 and C4 pathway; photo respiration; factors effecting photosynthesis; mode of nutrition. (autotrophic heterotrophic—saprophytic, parasitic and insectivorous plants), chemosynthesis.

Mechanism of respiration - - glycolysis, Krebs cycle, pentose pathway, anaerobic respiration respiratory quotient, compensation point, fermentation.

Unit V: Ecology environment and Biology in Human Welfare (8)

Organisms and their environment; factor—air, water, soil, biota, temperature and light; range of tolerance; ecological adaptation.

Levels of organization, population, species, community, eco-system and biosphere, Ecological interactions- - -symbiosis, mutualism, commensalisms, parasitism predation and competition Ecosystem - - structure and functions; productivity; energy flow; ecological efficiencies; decomposition and nutrient cycling; major biomes---forests, grasslands and deserts.

Ecological Succession - - -types and mechanism.

Natural resources - - -types use and misuse of natural resources.

Environmental pollution - --- kinds, sources and abatement of air, water, soil and noise pollution.

Global environmental changes - - - kinds, sources and abatement of air, water, soil and noise pollution.

Global environmental changes; Greenhouse Gases, global warming, sea level rise and ozone layer depletion.

Food production, breeding, improved varieties, biofertilizers, plant tissue culture and its applications; Brief account of some common crop and animal diseases; biopesticides; genetically modified food; bio-war, biopiracy; biopatent, biotechnology and sustainable agriculture.

ZOOLOGY

Unit VI: Taxonomy (06)

Salient features of invertebrate phyla: Porifera, Coelenterata, Platyhelminthes, nemathelminthes, Annelida, Mollusca, Arthropoda, Echinodermata, with typical examples. Salient features of various chordate classes: Cyclostomata, Chondrichthyes, Osteichthyes, Amphibia, Reptilian, Aves and Mammalia, with typical examples. Animal body pattern and symmetry. Body cavity in invertebrates and vertebrates.

Unit VII: Morphology, Anatomy & Physiology (10)

Animal tissues: epithelial, connective, muscular and nervous; structure and functions of human skin.

Animal nutrition: types, digestive organs of man, physiology of digestion, nutritional requirements of carbohydrates, proteins, fats, vitamins and minerals, digestion of carbohydrates, proteins and fats.

Gas exchange and transport: respiratory organs in man, mechanisms of respiration, physiology of respiration, respiratory volumes.

Circulation: composition of blood and lymph and their functions, open and closed type of vascular system, structure and pumping action of human heart, pulmonary, portal and systemic circulation, heart beat and blood pressure.

Excretion and osmoregulation : structure of human kidney, structure of nephron, physiology of excretion, ammonotelism, ureotelism, uricotelism, role of kidney in osmoregulation.

Nervous system: central nervous system, peripheral nervous system, autonomic nervous system, transmission of nerve impulse and reflex action, structure and function of sense organs (eye and ear).

Endocrine system: endocrine glands in man, hormones and their functions, diseases caused by hormonal imbalance

Movement and locomotion: types of joints and fractures, mechanisms of muscle contraction.

Human reproductive system: female reproductive system and ovarian cycle, menstrual cycle, male reproductive system, spermatogenesis, oogenesis.

Development biology: fertilization, zygote formation and cleavage, development of three germinal layers, gerontology, various cellular and extra-cellular changes during ageing, theories of ageing.;

Unit VIII: Cell Biology and Genetics (09)

Cell as a basic unit of life-discovery of cell, cell theory; prokaryotic and eukaryotic cell and their ultra structure; cell membrane concept (fluid Mosaic model): membrane transport, cellular movement (exocytosis, endocytosis); cell organelles and their functions-nucleus, mitochondria, plastids; endoplasmic reticulum, Golgi complex, lysosomes, microtubules, centriole, vacuole, cytoskeleton, cilia and flagella.

Principles of inheritance, Mendel's work, principles of dominance, segregation and independent assortment, test cross and back cross.

Incomplete dominance, linkage and crossing over, polygenic inheritance. Structure of eukaryotic chromosomes, nucleosome concept, plasmids and their role. DNA as genetic material-evidence from bacterial transformation and transduction. Nucleic acids-structure of DNA, DNA duplication, structure of RNA and its types. Genetic code, and protein synthesis, transcription translation, reverse transcription. Gene expression in prokaryotes with special reference to Lacoperon. Cell division-mitosis, meiosis.

Aneuploidy of autosomes (Down's Edward, Patau's syndrome), Aneuploidy of sex chromosomes (Klinefelter's syndrome, super-female, super-male, Turner's Syndrome), genetic counselling.

Unit IX: Origin of Life and Evolution. (06)

Origin of life-Oparin Haldane theory, Miller experiment, theories of evolution, Evidences of evolution, sources of variations (mutation and recombination in relation of evolution, genetic drift, migration, natural selection).

Evidences in favour of organic evolution-morphological, palaeontological, embryological and comparative anatomy.

Darwinism and Neo-Darwinism.

Evolution of man.

Speciation and isolation. (geographical and reproductive.)

Unit X: Environmental and Human Welfare (07)

Population, environment and development, population growth and factors vitality-natality, mortality, immigration, emigration, age and sex ratio); impact of population growth; reproductive health ; common problems of adolescence (Drugs, Alcohol and Tobacco); social and moral implications; mental and addictive disorders; Risks of indiscriminate use of

drugs antibiotics; population as a resource. Recent advances in vaccines; organ transplantation; immune disorders, modern techniques in diseases diagnosis; AIDS, ST, cancer (Types, causes, diagnosis, treatment); biotechnology in therapeutics-hormones, interferon and immuno modulations.

SYLLABI FOR COMMON ENTRANCE TEST
PART - I
PHYSICS

1. Units and dimensions and their applications, vectors in two dimensions, unit vector, resolution of a vector, scalar and vector product of vectors, motion in straight line, equations of motion, speed, velocity, motion in two dimensions, projectile motion, circular motion, uniform and non uniform Motion, their graphical representation, bending of cyclist and banking of roads, force and inertia, conservation of linear momentum, rocket propulsion, equilibrium of concurrent forces, laws of friction, angle and coefficient of friction, inertial and non-inertial frames of reference, work, energy and power, collision in one and two dimensions, mass energy equivalence, conservation of energy.

12 Marks

2. Center of mass of two particle system, center of mass of a rigid body, motion of centre of mass, torque, angular momentum and its conservation, moment of inertia, parallel axis and perpendicular axis theorems, moment of inertia of a ring, rod bar, disc, sphere-rolling of cylinder without slipping, Universal law of gravitation, inertial and gravitational mass, variation of acceleration due to gravity with altitude/depth, latitude and rotation of earth, gravitational potential energy, orbital and escape velocity, geostationary satellite and Kepler's laws.

06 Marks

3. Elastic properties, Hook.s law, co-efficient of elasticity, Poisson's ratio, elastic energy, viscosity, strokes law and terminal velocity, Stream line flow, Reynold's number, equation of continuity. Bernoulli's equation, velocity of efflux, surface tension, surface energy, excess of pressure inside a liquid drop and a bubble, capillarity. Pascal's law, Archimedes principal, floatation.

04 Marks

4. Kinetic theory of gases, pressure exerted by an ideal gas, kinetic interpretation of temperature, gas laws, first law of thermodynamics, C_p and C_v of ideal gas, thermodynamic process (reversible, irreversible, isothermal and adiabatic), Second law of thermodynamics, Carnot's engine and efficiency of heat engine, thermal conductivity, Black body radiation, Stefan's law, Wein's law, Newton's law of cooling.

04 Marks

5. Periodic motion, simple harmonic motion and its equation of motion, oscillations due to pendulum and spring, Kinetic energy and potential energy in S.H.M., examples of simple harmonic motion, forced oscillation and damped oscillations, wave motion, speed of a wave, principle of super position, reflection of waves,

harmonic waves, standing waves in strings and pipes, laws of string, resonance tube, beats, Doppler effect.

05 Marks

6. Coulomb's law, electric field due to a point charge, field due to a dipole and behavior of dipole in a uniform electric field, Gauss's law and its application to find field due to infinite line charge, plane sheet and uniformly charged thin spherical shell. Electric potential due to a point charge and a dipole, potential and electric fields, electric potential energy. Capacitance, parallel plate capacitor, series, parallel combination of capacitors, energy of charged capacitors.

07 Marks

7. Electric current, mobility and drift velocity, Ohm's law, resistivity and conductivity, resistance in series and parallel, Kirchhoff's law and its applications, electric power, thermal effects of current, Joule's law, EMF and terminal voltage of a cell, internal resistance of a cell, grouping of cells, thermoelectricity, Seebeck effect, Peltier effect.

05 Marks

8. Biot-Savart's law, magnetic field due to current loop, solenoid and straight conductor. Ampere's circuital law and its application to straight and toroidal solenoids, force on a moving charge in uniform magnetic field, Cyclotron, force between two parallel current carrying conductors, torque experienced by a current loop in a uniform magnetic field. Moving coil galvanometer and its conversion to ammeter and voltmeter. Terrestrial magnetism, magnetic elements at a place, Para-dia and ferro-magnetism, BH- curve.

06 Marks

9. Induced EMF, Faraday's law, Lenz's law of electromagnetic induction, self and mutual inductance, alternating current, impedance and reactance, circuits containing L, C and R, series resonant circuit. L-C oscillations, Power in AC circuit with L C and R in series. Transformers, AC generators, choke and wattless current, Q-factor.

05 Marks

10. Electromagnetic oscillation, electromagnetic waves, spectrum (elementary facts about their uses) and wave fronts and Huygen principle, interference, Young's double slit experiment, diffraction due to single slit, polarization of light and Brewster's law, refraction of light, lateral displacement, and dispersion of light due to prism, dispersive power, Raleigh's, scattering law, total internal reflection, rainbow, types of spectra.

06 Marks

11. Photoelectric effect, Einstein's photoelectric equation, photo cells, De-Broglie wave equation and its significance, size of nucleus, Bohr's model of atom, energy quantization, hydrogen spectrum, X-ray emission, Moseley's law, Maser (brief idea). Composition of nucleus, nuclear forces, mass defect and binding energy, mass energy relation. Radio-active decay law, half life and decay constant. Nuclear fission, Nuclear reactor and nuclear fusion.

07 Marks

12. Energy bands in solids, difference between metals, insulators and semiconductors using band theory, PN junction, diode as rectifier, photo-diode, Laser, LED, Junction transistors, transistors as an amplifier and oscillator, Zener diode as a voltage regulator, logic gates (OR, AND, NOT) and combination of gates - NAND & NOR. Modulation and detection (AM & FM), Sky and Space wave propagation, optical fiber. Digital and analog communication- Fax and Modem.

06 Marks

Note:

- 1. 20% of the questions should be of numerical type, containing not more than 15 marks.*
- 2. Each numerical should be of the type, it can be solved in about 1½ minutes of time.*

CHEMISTRY

Unit I: Chemical Arithmetic, Atomic structure and Nuclear Chemistry,

- a. Laws of chemical combination, mole concept (numericals) calculations using chemical equations. Equivalent weight of oxidizing and reducing agents.
- b. Atomic structure, Bohr's model of Hydrogen atom, Quantum numbers, Pauli's exclusion principle, Hund's rule and Aufbau principle. Heisenberg's uncertainty principle, de-Broglie wave equation and its significance.
- c. Nuclear chemistry: Properties of alpha, beta and gamma radiations, Group displacement law, half-life period and average life period. Different types of nuclear reactions using alpha particles, neutrons, protons and deuterons as projectiles, carbon-14 dating. Calculation of numbers of alpha and beta particles.

Marks 07

Unit II: Chemical Equilibrium

- a. Law of mass action, Le-Chatelier's principle, and its application to physical and chemical equilibria. Ionisation of weak electrolytes (Ostwald's dilution law)
- b. Acids and bases: Acid base equilibria. Bronsted-Lowry and Lewis concept, of acids and bases. Ionic product of water. pH and pOH scales, pK_a & pK_b values, solubility product, buffer solutions common ion effect, hydrolysis of salts.

Marks 04

Unit III: Chemical Kinetics

Effect of concentration and temperature on rate of chemical reactions, (Arrhenius Equation) Temperature Co-efficient, Concept of activation energy, First and second order reactions, half-life period, Units of rate constants for zero, first and second order reactions.

Marks 03

Unit IV: Solutions

Different ways of expressing the concentration of solutions (molarity, molality, mole fraction, ppm and normality), vapour pressure, Raoult's law, ideal and non-ideal solutions, colligative properties, determination of molecular masses of non-volatile solutes involving various colligative properties, abnormal

Unit V: Energetic and Chemical Thermodynamics.

Energy changes during chemical reactions, internal Energy and enthalpy changes, Enthalpy of combustion solution and neutralization, Hess's Law (Numerical problems) First, second & third law of thermodynamics, concepts of entropy and Free energy, spontaneity of a chemical reaction and Thermodynamic equilibrium.

Marks 04**Unit VI: Redox Reactions and electrochemistry.**

Determination of oxidation numbers, oxidation and reduction in terms of electron transfer, dependence of electrode and cell potential on concentration (Nernst Equation), electrode potential as a criteria for product formation in electrolysis. E.M.F. of Galvanic cell, relationship between free energy change and E.M.F. of a cell, definition and units of equivalent, molar and specific conductivity.

Marks 04**Unit VII: States of Matter.**

Dalton's law of partial pressure, Graham's law of diffusion of gases, causes of deviation from ideal behaviour, ideal gas equation and nature of 'R', Vander Waal's equation, surface tension and viscosity of liquids, crystalline and amorphous solids, crystal lattice, crystal types, radius ratio and structure of NaCl, CsCl and ZnS, co-ordination number, stoichiometric defects (Schottky, Frenkel and interstitial defects.)

Marks 03**Unit VIII: Surface chemistry.**

Freundlich absorption isotherm, preparation of colloidal solutions by physical and chemical methods, electrical properties (cataphoresis, electrosmosis, coagulation and protective colloids) homogeneous and heterogeneous catalysis. Classification of polymers, addition and condensation free radical cationic and anionic polymerization, commercially important polymers.

Marks 03**Unit IX: Periodic Properties.**

Classification of elements into s, p, d, and f blocks, variation of ionization energy, electron affinity, electronegativity, atomic and ionic radii along the period and down the group.

Marks 02

Unit X: Chemical Bonding and Molecular structure.

Types of chemical bonds, quantum theory of covalent bond, pi and sigma bonds, hybridization involving s, p and d-orbitals, dipole moments and hydrogen bond. VSEPR-theory and shapes of simple molecules like H₂O, NH₃, SO₂, CO₂, PCl₃, PCl₅, ClF₃, BF₃, SF₄, XeF₂, XeF₄

Molecular orbital theory, bond order and its significance, electronic configuration of H₂, He₂, O₂, F₂.

Marks 04

Unit XI: Chemistry of Representative Elements.

(S and P Block Elements)

Electronic configuration, oxidation states and trends in various properties like ionization energy, electron affinity, atomic radii, electronegativity and diagonal relationship of s and p block elements.

- a. Alkali metals: Hydration of ions, action with ammonia, flame colouration, solubility of hydroxides, carbonates and sulphates.
- b. Alkaline earth metals: Solubility of carbonates, hydroxides and sulphates.
- c. Boron Family: Structure of halides, relative acid strength of trihalides of boron.
- d. Carbon family. Hydrides and oxides.
- e. Nitrogen family. Oxides of nitrogen and phosphorous, Reducing nature, basic strength and boiling points of their halides.
- f. Oxygen family. Volatility, thermal stability, and acid character, reducing character and bond angles of their hydrides, oxyacids of sulphur.
- g. Halogen family. Bond energy, colour and oxidizing power, boiling point, acid strength and dipole moment, thermal stability, reducing power of hydrides, relative acidity and oxidizing power of oxyacids of halogens.

Marks 04

Unit XII: Transition metal including lanthanids.

Electronic configuration, oxidation states, colour and magnetic properties of transition elements oxides of V, Cr and Mn, alloys of copper silver and iron, oxidation states of lanthanides.

Marks 04

Unit XIII Co-ordination chemistry and Organometallics.

Werner's coordination theory, nomenclature, isomerism in co-ordination compounds (ionization, linkage, hydrate, co-ordination, geometrical and optical), bonding in co-ordination compounds on the basis of V.B. theory, stability of co-ordination compounds in solution, Ferrocene and Zeise's salt.

Marks 04

Unit XIV: Chemistry of Metal's

General aspects of Metallurgy, metallurgy of iron, copper and silver and their properties, preparation, properties and uses of copper sulphate and silver nitrate, various forms of iron.

Marks 03.

Unit XV: Nomenclature and basic concepts in the organic chemistry.

Nomenclature of organic compounds (monofunctional and polyfunctional groups), inductive, eletromeric resonance and hypercojgution effects, reaction intermediates, carbocations, carbanions and free radicals with their general stability order, types of organic reactions (addition, substitution, elimination and redox reactions), aromaticity on the basis of Huckel rule. Ortho, meta and para directing groups.

Marks 04

Unit XVI: Hydrocarbons.

Structural isomerism in alkanes, alkenes, alkynes and arenes, stereoisomerism: geometrical and optical isomerism, chirality, origin of chirality, specific rotation, racemisation and resolution, conformations in ethane and cyclohexane, relative configuration (D,L-Nomenclature), absolute (R and S system of nomenclature). Reactions of hydrocastions:-Addition,Subsititution and Oxidation reactions,eletrophiles and neucleophiles;acidic charater of aklyines.

Marks 04

Unit XVII: Organic chemistry based on Functional group-I

(Haloalkanes, haloarenes, alcohols and phenols)
General methods of preparation and properties of haloalkanes, haloarenes, alcohols, phenols, choloroform, iodoform and glycerol.

Marks 04

Unit XVIII: Organic chemistry based on function group-II

(Ethers, aldehydes and ketones, monocarboxylic acids).
General methods of preparation and properties of ethers, aldehydes, ketones and monocarboxylic acids, derivatives of monocarboxylic acids like acid halides ,acid anhydrides acid amides and esters,relative strength of carboxylic acids

Marks 04

Unit XIX: Organic chemistry based on functional group-III.

(Cyanides, isocyanides, nitrocompounds and amines)
General methods of preparation and properties of cyanides, Isocyanides, nitrocompounds and amines, relative basic character of amines.

Marks 04

Unit XX Molecules of life.

Carbohydrates: definition, classification, mutarotation, structure of amino-acids, peptides and proteins (Molish and ninhydrin tests). Classification and uses of vitamins. Chemicals in medicine and health care, Dyes and drugs, chemical reactions in atmosphere, ozone depletion and its effects.
Marks 02

Note; Numerical should not exceed 11 marks.

