

UNIT 14: NOMENCLATURE AND BASIC CONCEPTS IN ORGANIC CHEMISTRY (Marks: 03)

Nomenclature of organic compounds (monofunctional and polyfunctional groups), inductive, electromeric resonance and hyperconjugation 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., electro & nucleophiles.

UNIT 15: HYDROCARBONS**(Marks: 03)**

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).

UNIT 16: ORGANIC CHEMISTRY BASED ON FUNCTIONAL GROUP-I**(Marks: 02)**

Haloalkanes, haloarenes, alcohols and phenols: General methods of preparation and properties. Chloroform and Iodoform.

UNIT 17: ORGANIC CHEMISTRY BASED ON FUNCTION GROUP-II**(Marks: 03)**

Ethers, Aldehydes, Ketones, Monocarboxylic acids: General methods of preparation and properties. Derivatives of monocarboxylic acids like acid halides, acid anhydrides acid amides and esters.

Acidic motive of carboxylic acids

UNIT 18: ORGANIC CHEMISTRY BASED ON FUNCTIONAL GROUP-III**(Marks: 03)**

Cyanides, Isocyanides, Nitrocompounds and Amines: General methods of preparation and properties. Relative basic character of amines.

UNIT 19: MOLECULES OF LIFE**(Marks: 03)**

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. Acid rain, Green House effect & Global warming.

UNIT 20: POLYMERS**(Marks: 03)**

Introduction, Classification, Methods of Polymerisation (Addition, Condensation, Free Radical, Cationic & Anionic).

Natural & Synthetic Polymers: Polythene, Nylon, Polyester, Bakelite and Rubber.

Biodegradable and Non-Biodegradable Polymers.

Total Marks = 60**MATHEMATICS****UNIT 1: SETS, RELATIONS AND FUNCTIONS****(Marks: 06)**

Sets and their representation, finite and infinite sets, empty set subsets, subset of real numbers especially intervals, power set, universal set. Venn diagram, union and intersection of sets. Difference of sets, Complement of a set. Ordered pairs, Cartesian product of sets, number of elements in the Cartesian product of two finite sets.

Relations, Domain, co- domain and range of relation, types of relations, reflexive, symmetric, transitive and equivalence relations.

Functions as special kind of relations from one set to another, domain, co-domain and range of a function. One to one, onto functions. Real valued functions of the real variable; constant, identity, polynomial, rational, modulus, signum and the greatest integer functions with their graphs. Sum, difference, product and quotients of functions. Composition of functions, inverse of a function, binary operations.

UNIT 2: COMPLEX NUMBER; LINEAR INEQUATION; LINEAR PROGRAMMING (Marks: 06)

Complex number: Conjugate of a complex number, modulus and amplitude (argument) of a complex number, Argand's plane and polar representation of complex numbers, algebraic properties of complex numbers. Fundamental theorem of algebra, solution of Quadratic equation in the complex number system. Square root of a complex number.

Linear inequation: Algebraic solution of linear inequalities in one variable and two variables.

Linear programming: Introduction, definition of related terminology such as constraints, objective function, optimization, different type of linear programming problem (L.P), mathematical formulation of L.P problem, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions.

UNIT 3: SEQUENCE AND SERIES, PERMUTATION AND COMBINATION & BINOMIAL THEOREM (Marks: 06)

Sequence and series: Arithmetic progression (A.P), arithmetic mean (A.M), nth term, sum to n-terms of an A.P, Geometric progression (G.P), Geometric Mean (G.M), nth term, sum to n-terms and sum to infinity of a G.P. Relation between A.M and G.M. Sum to n terms of $\sum n$, $\sum n^2$ and $\sum n^3$.

Permutation and combination: Fundamental principle of counting, factorial n, permutations $P(n,r)$ and combinations $C(n,r)$, simple applications.

Binomial Theorem: Binomial theorem for positive integral power general and middle terms in the Binomial expansion. Pascal's triangle and simple applications.

UNIT 4: TRIGONOMETRIC AND INVERSE TRIGONOMETRY FUNCTIONS (Marks: 06)

Positive and negative angles, measuring angles in radians and in degrees, Conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Periodicity of Trigonometric functions. Basic Trigonometric identities $\sin^2 x + \cos^2 x = 1$ for all Sign of x etc. Trigonometric functions and their graphs. Expressions for $\sin(x \pm y)$, $\cos(x \pm y)$, $\tan(x \pm y)$, $\cot(x \pm y)$, sum and product formulae.

Identities related to $\sin 2x$, $\cos 2x$, $\tan 2x$, $\sin 3x$, $\cos 3x$, and $\tan 3x$. General and principal solutions of trigonometric equations of the type $\sin x = \sin a$, $\cos x = \cos a$, $\tan x = \tan a$.

Inverse trigonometric functions, range, domain, principal value branches. Graphs of inverse trigonometric functions, elementary properties of inverse trigonometric functions

UNIT 5: MATRICES AND DETERMINANTS**(Marks: 04)**

Matrices, concepts, notation, order, equality, types of matrices, Zero matrix, transpose of matrix, Symmetric and skew symmetric matrices. Addition, multiplication, scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication of matrices. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (order 2x2). Concept of elementary row and column operation, Invertible matrices and uniqueness of inverse, if it exists. (Matrices with real entries).

Determinants of square matrix (upto 3x3 matrices) properties of determinants, minors, cofactors and applications of determinants in finding 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 using inverse of a matrix, Cramer rule & its applications.

UNIT 6: LIMIT, CONTINUITY AND DIFFERENTIATION**(Marks: 08)**

Concept of limit of a function. Theorems on Limits, Evaluation of limits using standard results

$$\lim_{x \rightarrow 0} \frac{\sin x}{x}, \lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}, \lim_{x \rightarrow 0} \frac{1}{x}, \lim_{x \rightarrow \infty} \frac{1}{x}, \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$$
$$\lim_{x \rightarrow 0} (1 + x)^{1/x}, \lim_{x \rightarrow 0} \frac{\log(1 + x)}{x}, \lim_{x \rightarrow 0} \frac{e^x - 1}{x},$$

Continuity of a function at a point. Continuity of Sum, product and quotient of functions. **Derivative**: definition of a derivative of a function, geometrical interpretation of the derivative.

- Derivative of sum, difference, product and quotient of two or more functions.
- Derivative of algebraic and composite functions.
- Derivative of trigonometric and inverse trigonometric functions.
- Chain rule, derivative of implicit functions.
- Derivative of logarithmic and exponential functions.
- Logarithmic differentiation.
- Derivative of functions expressed in parametric forms.

Second order derivatives.

- Rolle's and Lagrange's Mean Value Theorem and their geometrical interpretation and their simple applications.

Application of Derivative: rate of change, increasing and decreasing functions, tangents and normals, approximation, maxima and minima (first derivative and second derivative test). Simple problems.

UNIT 7: INTEGRATION AND DIFFERENTIAL EQUATIONS**(Marks: 07)**

Integration as inverse process of differentiation. Integration of variety of functions by Substitution, by parts, by partial fractions. Simple integrals of the type:

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}},$$

$$\int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \frac{(px + q)}{ax^2 + bx + c} dx, \int \frac{(px + q)}{\sqrt{ax^2 + bx + c}} dx,$$

$$\int \sqrt{a^2 \pm x^2} \cdot dx, \int \sqrt{x^2 - a^2} \cdot dx,$$

$$\int \sqrt{ax^2 + bx + c} dx, \int \frac{dx}{a + b \cos x}, \int \frac{dx}{a + b \sin x}, \int (px + q)\sqrt{ax^2 + bx + c} dx$$

Definite integrals as a Limit of a sum. Fundamental Theorem of calculus. Basic properties of definite integrals Evaluation of definite integrals.

Application of integrals: Application in finding the area under simple curves, especially lines. Areas of circles, parabolas and ellipses (in standard form) Area under the curve $y = \sin x$, $y = \cos x$, area between the above two curves.

Differential Equations: Definition, order and degree of a differential equation. General and particular solutions of a differential equation. Formation of a differential equation whose general solution is given. Solution of differentiation equation by method of separation of variables. Solution of Homogeneous differential equation of first order and first degree. Solution of linear differential equation of the type:

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

$$\frac{dx}{dy} + px = q, \text{ where } p \text{ and } q \text{ are functions of } y \text{ alone.}$$

UNIT 8: STRAIGHT LINES AND CONIC SECTIONS

(Marks: 05)

Distance between two points, section, slope of a line, angle between two lines, various forms of equations of lines, point-slope form, intercept form, two point form, and normal form. General equation of a line, distance of a point from a line. Conic Section: Sections of a cone, circles, parabola, ellipse, hyperbola, a point, a straight line and a pair of intersecting lines as a degenerated case of conic section. Standard equation of a circle, parabola, ellipse, and hyperbola and their simple properties.

UNIT 9: STATISTICS AND PROBABILITY

(Marks: 06)

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

PROBABILITY :Random Experiment: outcome, sample spaces.

Events: Mutually exclusive and exhaustive events. Axiomatic (set theoretic) probability, probability of an event, probability of “Not” and “Or” events. Multiplication theorem on probability, conditional probability, independent events, total probability, Baye’s theorem, random variable and its probability, distribution, mean and variance of a random variable. Repeated independent (Bernouli) trials and Binomial distribution.

UNIT 10: VECTORS AND THREE DIMENSIONAL GEOMETRY (Marks: 06)

Vectors and scalars, magnitude and direction of a vector Direction Cosines and ratios of a vector. Types of vector, equal, zero, unit, parallel and collinear vectors. Position vector of a point, negative of a vector, components of a vector, addition of vectors, Scalar multiplication, 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. Coordinate axes and Coordinate planes in three dimensions of a point, distance between two points and sectional formula.

STRAIGHT LINES AND SPACE Direction cosines and direction ratios of a line joining two points. Cartesian and vector equation of a line (in various forms), coplanar and skew-lines, shortest distance between two lines.

PLANES Cartesian and vector equation of a plane (in various forms). Distance of a point from a plane.

Angle between:

- i. Two lines
- ii. Two planes.
- iii. A line and a plane

12. DETERMINATION OF MERIT:

- ❖ Merit list shall be prepared on the basis of aggregate marks obtained in qualifying examination (12th class) by the candidates, in case entrance examination is not conducted;
- ❖ If the entrance examination is conducted, the selection of candidates for admission to the programme will depend on their performance at the entrance test and eligibility. The Board shall prepare list in order of inter-se merit of candidates in the CET-2020 entrance test in descending order for the Open Merit Category and similarly for each Reserved Category separately;
- ❖ For the purposes of allotment of seats to the reserved category candidates in Government Engineering Colleges, inter-se-merit within each reserved category shall be taken into consideration;
- ❖ In the event of the number of candidates belonging to a reserved category being less than the number of seats available for the category, the resultant vacancies shall be filled from amongst the candidates figuring in the open merit category strictly in order of merit;
- ❖ In case two or more candidates have obtained the same number of marks in entrance test, the inter-se-merit of such candidates shall be determined by taking into account:
 - Marks obtained in Mathematics component of the Entrance test;
 - Marks obtained in Physics component of the Entrance test, if marks obtained in Mathematics component are equal;
 - Marks obtained in Chemistry component of the Entrance test if marks obtained in Mathematics and Physics components are equal;
 - Candidate older in age if marks obtained in Math, Physics and Chemistry are same.