

energy and cell potentials. Nernst equation, commercial cells, fuel cell, electrochemical theory of corrosion.

11. Surface chemistry, Colloids and Catalysis; Adsorption, Colloids (types preparation and properties), Emulsions, Micelles, Catalysis: Types and characteristics.

### **INOGRANIC CHEMISTRY:**

12. Principles of metallurgical operations: Furnaces, ore concentration, extraction, purification metallurgies of Na, Al, Fe, Cu, Ag, Zn and Pb and their properties.
13. Chemical periodicity: S.p.d. and f-block elements, periodic Table: periodicity : atomic and ionic radii valency. ionization energy, electron affinity electronegativity, metallic character.
14. Comparative study of elements: Comparative study of the following families of elements: (i) Alkali metals (ii) Alkaline earth metals (iii) Nitrogen family (iv) Oxygen family (v) halogens (vi) Noble gases.
15. Transition metals: Electronic configuration of 3d-metal ions, oxidation states, other general characteristic properties, Potassium permanganate, potassium dichromate.
16. Co-ordination compounds: Simple nomenclature, bonding and stability, classification and bonding in organometallics.
17. Chemical analysis: Chemistry involved is simple inorganic qualitative analysis: calculations based on acid-base titrimetry.

### **ORGANIC CHEMISTRY:**

18. Calculation of empirical and molecular formula of organic compounds, Nomenclature of organic compounds, common functional groups isomerism Structure and shapes of alkanes, alkanes and benzene.
19. Preparation properties and uses of alkynes, alkenes, benzene petroleum, cracking octane number, gasoline additives.
20. Nomenclature, Physical chemical properties, correlation of physical properties with structure properties and uses of haloalkanes, halobenzenes, alcohols and phenols: General ideas of some polyhalogen compounds viz dichloroethanes, dichloroethers, chloroform, carbon tetrachloride D.D.T. benzene hexachloride.
21. Nomenclature, methods of preparation, Chemical properties correlations of physical properties with structures and uses of ethers aldehydes, ketones, carboxylic acids and their derivatives, Brief account of the chemistry of Cyanides isocyanides, amines and nitro compounds.
22. Polymers: Classification: Preparation and uses of common natural and synthetic polymers.
23. Biomolecules: Classification, Structures and biological importance of carbohydrates amino acids, peptides, proteins and enzymes, nucleic acids and lipids.

## **2- गणित MATHEMATICS**

**1. ALGEBRA:** Algebra of complex numbers. Graphical representation of complex numbers modulus, and argument of complex numbers, conjugated of a complex number, Triangle inequality,

cube roots of unity. Arithmetic, geometric and harmonic progression. Arithmetic, geometric and harmonic means between two numbers. Sum of squares and cubes of first natural numbers. Theory, geometric equation, relations between roots and coefficients. Quadratic expressions, quadratic equations in one variable, Permutations and combinations. Binomial Theorem (any index) exponential and logarithmic series. Determinants upto third order and their order and their elementary properties matrices types of matrices, adjoint and inverse of matrix, elementary. Application in solving simultaneous equation upto three variables.

**2. TRIGONOMETRY:** Trigonometry functions and their graphs, addition and subtraction formulae; formulae involving multiple and submultiple angles, general solutions of trigonometrical equations. Relations between sides and angles of a triangle. Solutions of triangles, inverse; trigonometrical functions, height and distance (Simple Problems).

**3. CO-ORDINATE GEOMETRY OF TWO DIMENSIONS:** Rectangular cartesian coordinates. straight line, pair to straight lines, distance of a point from a line, angle between two lines. Circle, tangents and normals, system of circles. Conic section; Parabola, Ellipse and Hyperbola in standard forms with elementary properties, tangents and normals.

**4. CO-ORDINATE GEOMETRY OF THREE DIMENSIONS:** Rectangular co-ordinate system. Direction cosines and direction ratios, equation of plane in standard forms. Perpendicular distance from a point, equation of a line angle between two lines.

**5. VECTOR ALGEBRA:** Definition of vector, addition of vector, components in three dimensional space. Scalar and vector products. Triple products, simple application in geometry and mechanics.

**6. DIFFERENTIAL CALCULUS:** Function, polynomial, rational trigonometric, logarithmic and exponential, inverse functions. Limit continuity and differentiability of functions, differentiation of rational, trigonometric and exponential functions. Application of derivative in elementary problems in mechanics, increasing and decreasing functions. Maxima and Minima of function of one variable. Roll's theorem and mean value theorem.

**7. INTEGRAL CALCULUS:** Integration as the inverse process of differentiation. Integration by parts. By substitution and by partial fraction. definite integral. Areas under simple curves.

**8. DIFFERENTIAL EQUATIONS:** Formulation of differential equation, ordered degree. Solution of differential equations by separation of variable method. Homogeneous form. Linear differential equation of first order.

**9. STATISTICS :** Probability, addition and multiplication laws. Conditional probability. Binomial distribution. simple problems in correlation and regression.

**10. NUMERICAL METHODS :** Solution of equation by the methods of bisection, false position and Newton-Raphson. Numerical integration by trapezoidal and Simpson's Rule.

**11. LINEAR PROGRAMMING:** Definition and formation of linear programming problems. solution by graphical method.