GAT 2021

B.Tech. Maths, Physics & Chemistry
Syllabus

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SECTION – A: MATHEMATICS

UNIT – 1

SETS, RELATIONS AND FUNCTIONS: Sets and their representation, Union, Intersection and compliment of sets, and their algebraic properties, power set, Relation, Types of relation, Equivalence relation, Functions, one-one, into and onto functions, composite functions.

UNIT – 2

MATHEMATICAL INDUCTION: Principle of Mathematical Induction and its simple applications.

MATHEMATICAL REASONING: Statements, Logical operations and, or, implies, implied by, if and only if. Understanding of tautology, contradiction, Converse and Contra positive.

UNIT – 3

QUADRATIC EQUATIONS & THEORY OF EQUATIONS: Quadratic equations in real and complex number system and their solutions. Reminder and Factor Theorems, common Roots, General Quadratic expression, Finding the range of a function, Location of roots, Solving inequalities using location of roots.

THEORY OF EQUATIONS: The relation between the roots and coefficients in an equation; Solving the equation when two or more roots of it are connected by certain relations; Equations with real coefficients, imaginary roots occur in conjugate pairs and its consequences; Transformation of equations, Reciprocal equations.

UNIT – 4

BINOMIAL THEOREM AND ITS SIMPLE APPLICATIONS

Binomial theorem for a positive integral index, general term and middle term, properties of Binomial coefficients and simple applications.

UNIT – 5

SEQUENCES AND SERIES: Arithmetic and Geometric progressions, insertion of arithmetic, geometric means between two given numbers. Relation between A.M. and G.M. Sum to n terms of special series $\sum n, \sum n^2, \sum n^3$. Arithmetic - Geometric progression.
UNIT – 6

PERMUTATIONS & COMBINATIONS:
Definition of linear and circular permutations; To find the number of permutations of n dissimilar things taken ‘r’ at a time. To prove \( n_r = (n-1)_{r-1} + (n-1)_{r-1} \) from the first principles; To find number of Permutations of n Dissimilar things taken ‘r’ at a time when repetition of things is allowed any number of times.; To find number of circular Permutations of n Different things taken all at a time.; To find the number of Permutations of ‘n’ things taken ‘r’ at a time when some of them are alike and the rest are dissimilar; To find the number of combinations of ‘n’ dissimilar things taken ‘r’ at a time; To prove i) If \( nC_r = nC_s \) then \( n = r+s \) or \( r=s \) ii) \( nC_r + nC_{r+1} = (n+1)C_r \).

UNIT - 7

MATRICES AND DETERMINANTS: Matrices, algebra of matrices, types of matrices, determinants and matrices of order two and three. Properties of determinants, evaluation of determinants, area of triangles using determinants. Adjoint and evaluation of inverse of a square matrix using determinants and elementary transformations, Test for consistency and solution of simultaneous linear equations in two or three variables using determinants and matrices, and rank of matrix.

UNIT - 8


UNIT- 9

THREE DIMENSIONAL GEOMETRY: Co-ordinates of a point in space, Distance between two points, Section formula, Direction ratios and direction cosines, Angle between two intersecting lines. Skew lines, the shortest distance between them and its equation. Equations of a line and a plane in different forms, Intersection of a line and a plane, Coplanar lines.

UNIT- 10

TRIGONOMETRY: Trigonometric ratios, Compound angles, multiple and sub-multiple angle, Transformations, Trigonometric expansions using DeMoivre’s Theorem. Trigonometric equations, Inverse Trigonometry and Heights and distances (only 2D problems).
UNIT – 11

PROPERTIES OF TRIANGLES: Sine rule, cosine rule, Tangent rule, projection rule, Half angle formulae and area of triangle. In-circle and ex-circle of a Triangle. Pedal Triangle, Ex-central Triangle, Geometry relation of Ex-centres, Distance between centres of Triangle. m-n Theorem, problems and quadrilateral, regular polygon, solution of Triangle (Ambiguous cases).

COMPLEX NUMBERS: Definitions, Integral Power of iota(i), Algebraic operations with complex numbers, square root of a complex number, Geometrical representation of a complex number, Modz, Arg of Z, polar term of Z, Eulers form of Z, Conjugate of Z, Properties of conjugate, solving complex equations, Demovre’s Theorem, Properties of \( \sqrt[3]{1}, \sqrt[4]{1}, \sqrt[n]{1} \), Geometrical applications of complex numbers.

UNIT – 12


UNIT – 13

APPLICATIONS OF DERIVATIVES: Rate of change of quantities, Errors and approximations, Tangent and normals, maxima and minima of functions of one variable, mean value theorems (Rolle’s, lagrange’s, Intermediate value theorem).

UNIT – 14

INDEFINITE INTEGRATION: Fundamental Integration formulae, Method of integration, Integration by parts, Integration by substitution, Integration of Rational and Irrational Algebraic functions, Integral of the form \( \int x^m(a+bx^n)^pdx \) Integration using Euler’s substitution. Reduction formulae over indefinite integrals, Integration using differentiation.

UNIT – 15

APPLICATIONS OF INTEGRALS: Integral as limit of a sum. Fundamental Theorem of integral calculus. Problems on all the properties of definite integrals. Libnitz rule. Determining areas of the regions bounded by curves.
UNIT - 16

CO-ORDINATE GEOMETRY: Locus: Definition of locus; Equation of locus and its illustration on complete geometry; Translation & Rotation of axes and its illustrations

STRAIGHT LINES: Different forms of straight lines, distance of a point from a line, lines through the point of intersection of two given lines, angular bisectors of two lines, Foot of perpendicular, Image point (vs) point, point (vs) line and line (vs) line. Concurrences of lines, centroid, orthocenter, incentre and circumcentre of triangle.

UNIT - 17

CIRCLES: Equation of a circle-Standard form-centre and radius-Equation of a circle with a given line segment as diameter- Equation of circle through three non-colinear points-parametric equations of a circle. Position of a point in the plane of the circle- power of a point-Def. of a tangent-Length of tangent. Position of a straight line in the plane of the circle-condition for a straight line to be a tangent– chord joining two points on a circle - equation of the tangent at a point on the circle – point of contact – Equation of normal. Chord of contact-Pole, Polar-conjugate points and conjugate lines- Equation of chord with given mid point. Relative positions of two circles-circles touching each other-externally, internally, common tangents-points of similitude-Equation of tangents from an external point. Angle between two intersecting circles. Conditions for Orthogonalities. Concepts of Radical axis and Radical Centre.

UNIT - 18

PARABOLA, ELLIPSE, HYPERBOLA AND POLAR CO-ORDINATES:  

a) PARABOLA: Conic sections-parabola-Equation of parabola in standard form-Different forms of parabola; parametric equations. Equation of tangent and normal at a point on the parabola (cartesian and parametric)- condition for a straight line to be a tangent.

b) ELLIPSE: Equation of Ellipse in standard form, parametric equations. Equation of tangent and normal at a point on the Ellipse (Cartesian and parametric) condition for a straight line to be a tangent.

c) HYPERBOLA: Equation of hyperbola in standard form-parametric equations, Rectangular Hyperbola.; equation of tangent and normal at a point on the hyperbola (Cartesian and parametric) condition for a straight line to be a tangent. Asymptotes.
UNIT - 19


UNIT - 20

PROBABILITIES, RANDOM VARIABLES & DISTRIBUTIONS AND STATISTICS:

PROBABILITY: Random experiment, random event, elementary events, exhaustive events, mutually exclusive events, Sample space, Sample events, Addition theorem on Probability. Dependent and independent events, multiplication theorem, Baye’s theorem.

RANDOM VARIABLES & DISTRIBUTIONS: Random variables, Distributive functions, probability distributive functions, Mean, variance of a random variable; Bernoulli trials and Binomial distributions.

STATISTICS: Measures of Dispersion; Calculation of Mean, Median, Mode of grouped and ungrouped data, Calculation of Standard Deviation, Variance and Mean deviation for grouped and ungrouped data.

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SECTION – B: PHYSICS

UNIT - 1

1. UNITS AND DIMENSIONS: Units for fundamental and derived quantities; Systems of Units; SI system of units – rules for writing unit, derived units, multiple units and sub multiple units in SI system; Measurement for quantitative study, Accuracy and precision of measuring instruments; Errors due to external causes – constant type, systematic type and environmental type; Errors due to imperfections in experimental techniques/procedure/personal/observation – random errors, gross errors, absolute errors, mean absolute error and relative error percentage error; errors due to addition, subtraction, multiplication division and powers of observed quantities; Significant figures, Dimensions of physical quantities, dimensional formulae, applications and limitations of dimensional analysis.


UNIT - 2


UNIT - 3

1. CENTRE OF MASS: Introduction, Centre of mass, difference between centre of mass and centre of gravity. Co-ordinates of centre of mass. Centre of mass of particles along a line, center of mass of system of particles in a plane, center of mass of system of particles in space. Centre of mass of rigid body with homogenous distribution of mass of a thin rod, circular ring, disc and sphere. Motion of centre of mass (Velocity and acceleration of center of mass) characteristics of centre of mass, laws of motion of the centre of mass, velocity and acceleration. Explosion - motion of the centre of mass of earth - moon system

2. COLLISIONS: Introduction - Elastic and inelastic collisions. Collisions in one dimension (elastic and inelastic) body at rest, bodies moving in same direction and opposite directions. Co-efficient of restitution definition. Equation for height attained for freely falling body after number of rebounds on floor. Two dimensional collision.

UNIT - 4


Rolling without shipping and toppling.

2. GRAVITATION: Basic forces in nature; The Universal law of gravitation; Nature of gravity; Relation between Universal gravitational constant (G) and acceleration due to gravity(g); variation of “g” with altitude, depth, latitude and shape of earth; Limitations of Newton’s third Law. Idea of inertial and non-inertial frames – Inertial and gravitational masses – Gravitational Potential and Gravitational Potential Energy. Escape velocity, orbital velocity and relation between them – Geo stationary Satellites, their uses.
UNIT – 5


UNIT - 6


UNIT – 7


2. **WAVE MOTION:** Longitudinal and transverse waves, Equation for a progressive wave, principle of superposition of waves, reflection of waves. Formation of stationary waves on a stretched string.


UNIT – 8

1. **RAY OPTICS AND OPTICAL INSTRUMENTS:** Reflection of light, Reflection of light at plane and spherical surfaces, mirror formula. Reflection of light, Snell’s Law, Total internal reflection. Lens formula, Magnification power of a lens, Combination of lenses, Culling of a lens, Silvering of a lens. Refraction through a prism. Microscope and astronomical telescope and their magnifying powers.

UNIT – 9


UNIT – 10

1. ELECTROMAGNETISM: Biot-savart Law – Ampere Law – Magnetic field near a long straight wire and magnetic field at the center of a circular coil carrying current (with derivation) – Field on the axis of a circular coil carrying current (with expressions only) Tangent Galvanometer – principle and working – Definition of reduction factor – force on a moving charge in a magnetic field –
force on a current carrying conductor in a magnetic field – force between two long straight parallel conductors carrying current – definition of ampere – Fleming’s left hand rule-current loop as a magnetic dipole, force and torque on current loop in a uniform magnetic field – magnetic dipole moment of a revolving electron – principle, construction and working of a moving coil galvanometer – conversion of moving coil galvanometer into ammeter and voltmeter – comparison of M.C.G with T.G.


**UNIT- 11**

1. **DUALNATURE OF MATTER AND RADIATION:** Dual nature of radiation. Photoelectric effect, Hertz’s and Lenard’s observation. Einstein’s photoelectric equation particle nature of light. Matter wave’s and de-Broglie’s theory, Davison-Germer experiment.


3. **SEMI-CONDUCTOR DEVICES AND COMMUNICATION SYSTEMS:** Intrinsic and Extrinsic semiconductors (n and p type) Junction diode – p-n junction, depletion layer and barrier potential, forward and reverse bias – current voltage characteristics of junction diode – p-n diode as half wave and full wave rectifier, (only qualitative treatment) Zener diode as a voltage regulator – I-V characteristics of LED, photodiode, solar cell and Zener diode – Transistor – function of emitter, base and collector - p-n-p, n-p-n transistors - Biasing of transistors, current, voltage – Characteristics of transistor in CE configuration – Transistor as common emitter amplifier (qualitative treatment). Logic gates (OR, AND, NOT, NAND and NOR) – Communication systems; Elements of communication systems (block diagrams 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 – Modulation – Need for modulation.

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SECTION – C: CHEMISTRY

UNIT - 1


2. NUCLEAR CHEMISTRY: Composition of Nucleus, Isotopes, Isotones, Isobars, Isodiaphers, Factors efecting nuclear stability, mass defect, binding energy, N/P ratio. Radioactive disintegration and its rate – Half life and average life, Types of nuclear reactors – Fission and Fussion with examples one each. Radioactive isotopes and their applications – Iodine 131, Cobalt 60, Sodium 24, C14 and P30-Properties of α β and γ rays.


UNIT - 2

1. CLASSIFICAITON OF ELEMENTS AND PERIODICITY OF PROPERTIES : Concept of grouping of elements in accordance with their properties, The periodic law, The significance of atomic number and electronic configuration as the basis for periodic classification - Classification of elements into s,p,d, f blocks and their main characteristics - Classification of elements based on their properties.

3. ALKALI AND ALKALINE EARTH METALS: General introduction, electronic configuration, occurrence, anomalous properties of first element in each group, diagonal relationship, trends in properties like ionisation enthalpy, atomic and ionic radii, reactivity with oxygen, hydrogen, halogens and water. Preparation and properties and uses of the compounds sodium hydroxide, salts of oxoacids, sodium carbonate, sodium hydrogen carbonate, sodium chloride, biological importance of sodium and potassium, preparation and uses of CaO, CaCO₃ and CaSO₄. Industrial uses of lime and limestone - Biological importance of Mg and Ca.

UNIT - 3

1. STATES OF MATTER: GASES AND LIQUIDS: Grahams Law of diffusion, Dalton’s law of partial pressures, Avogadro's law. Ideal behavior, Empirical derivation of Gas equation, Ideal gas equation. Kinetic molecular theory of gases, Kinetic gas equation (No derivation) and deduction of gas laws from kinetic gas equation, Distribution of molecular velocities - types of molecular velocities, behavior of real gases, Deviation from ideal behavior, compressibility factor Vs pressure diagrams of real conditions for liquefication of gases, critical temperature, Liquid state - properties of liquids in terms of Intermolecular attractions, Vapour pressure, viscosity and surface tension (Quantitative Idea only. No mathematical derivation).

2. CHEMICAL THERMODYNAMICS : 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, Exothermic and endothermic reactions. Measurement of U and H, Enthalpies of bond dissociation, combustion, neutralization, formation, atomization, sublimation, phase transition, ionization and dilution, Thermo-chemical equations.

Hess's law of constant heat summation, Driving force for a spontaneous process, Thermodynamic representation of criteria of spontaneity in terms of entropy, entropy as a state function, Gibbs free energy, Gibbs free energy change for spontaneous, non spontaneous process and equilibrium process.

UNIT - 4

1. SOLUTIONS: Classification of solutions, Molarity Normality, Molality, Mole fraction, Dilute solutions, Vapour pressure, Raoults Law, Limitations of Raoults Law Colligative properties, relative lowering of vapour pressure, elevation of boiling point, depression in freezing point, Osmosis and osmotic
2. **IONIC EQUILIBRIUM**: Lowry - Bronsted acids and bases theory, Lewis theory, limitations of Lewis theory, Ionic equilibrium, ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionic product of water. Concept of p\text{H}, Hydrolysis of salts (elementary idea), hydrolysis constant, buffer solutions, solubility product and common ion effect with illustrative examples.

3. **CHEMICAL EQUILIBRIUM**: Equilibrium in physical and chemical process, Dynamic nature of equilibrium, law of mass action, Equilibrium constant, Factors affecting equilibrium, Relation between Kp and Kc, Le - Chatlier's principle, applications to the industrial processes like (1) ammonia - Haber’s process (2) H\textsubscript{2}SO\textsubscript{4}-Contact process.

**UNIT - 5**

1. **SOLID STATE**: Classification of solids based on different binding forces such as molecular, ionic, covalent solids and metallic solids, Treatment of metallic bond and metallic / solids, Amorphous and crystalline solids, Unit cell in two-dimensional and three-dimensional lattices, Seven crystal systems and Bragg's equation, X-ray study of crystal structure, Bragg's method. Calculation of density of unit cell, packing in solids, No. of atoms per cubic unit cell. Point defects - Schottky and Frenkel defects. Electrical and magnetic properties.


**UNIT - 6**

1. **CHEMICAL KINETICS**: Concept of reaction rate, factors affecting reaction rates, Rate law, units of rate constant, Order and molecularity, methods of determination of order of reaction, Integrated rate equations and half lives for zero and first order reaction, Collision theory of reaction rates (elementary ideas), concepts of activation energy (Arrhenius equation).

2. **ELECTRO CHEMISTRY**: Conductance in electrolytic solutions, Specific and molar conductances- variation of conductance with concentration, Kohlrausch's law, application to calculation of equivalent conductance of
weak electrolytes. Electrolytes and non-electrolytes, redox reactions, electrolysis - some typical examples of electrolysis viz; fused NaOH, brine solution, fused MgCl₂, Faraday's laws of electrolysis, Galvanic and voltaic cells representation and notation of electrochemical cells with and without salt bridge, Standard hydrogen electrode and electrode potentials, electro chemical series, EMF of cell, Nernst equation and its applications, calculation of EMF of electro chemical cells, Primary cell-dry cell/Lechlanche cell, secondary cells - fuel cells - Hydrogen – Oxygen fuel cell.

UNIT - 7

1. 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, uses, some important compounds: Borax and Boric acid. Boron hydrides, aluminium - uses, reactions with acids and alkalis, Alums.

2. GROUP 14 ELEMENTS: General introduction, electronic configuration, occurrence, Variation of properties, oxidation states, trends in chemical reactivity, Anomalous behavior of the first element of the group Carbon - catenation, allotropic forms, physical and chemical properties and uses. Similarities between carbon and silicon, uses of oxides of carbon, Important compounds of silicon - silicon dioxide and a few uses of silicon tetrachloride, silicones, silicates and zeolites (Elementary ideas) Fuel gases : Manufacture and uses of producer gas and water gas.

3. GROUP 18 ELEMENTS (ZERO GROUP ELEMENTS): General introduction, electronic configuration, occurrence, Isolation trends in physical and chemical properties, uses, compounds of xenon oxides and xenon Fluorides (structures only).

UNIT - 8

1. GROUP 15 ELEMENTS (VA GROUP ELEMENTS): Occurrence- physical states of Nitrogen and Phosphorous; allotropy, catenation. electronic configuration, oxidation states, General characteristics of hydrides, structure of hydrides, general characteristics of oxides, general characteristics of halides, Oxyacids of nitrogen, Oxyacids of phosphorous, preparation and uses of nitric acid and ammonia, superphosphate of lime.

2. GROUP 16 ELEMENTS (VI GROUP ELEMENTS): Occurrence, electronic configuration, oxidation states,physical states of Oxygen and Sulphur and their structure, allotropy, general characteristics of hydrides, oxides and halides, structural aspects of oxyacids of chalcogens, Ozone, uses of ozone, Sodium thiosulphate, Sulphuric acid - industrial process of manufacture.
3. **GROUP 17 ELEMENTS (VII A GROUP ELEMENTS):** Occurrence, electronic configuration and oxidation states, Physical states of halogens, I.P values, electronegativity and electron affinity, bond energies, chemical reactivity, oxidizing power of fluorine, chlorine, structural aspects of oxy acids of chlorine, preparation, properties and uses of fluorine, chlorine and bleaching powder, Interhalogen compounds -structures only.

**UNIT - 9**

1. **TRANSITION ELEMENTS:** General introduction, electronic configuration, Occurrence and characteristics of transition metals, general trends in properties of first row transition elements- metallic character, ionization energy, Variable oxidation states, atomic and ionic radii, color, catalytic property, magnetic property, interstitial compounds, Alloy formation. Preparation and properties of KMnO₄, K₂Cr₂O₇, Ag₂O, AgNO₃, Ag₂S₂O₃.

2. **LANTHANIDES :** Electronic configuration, variable oxidation states, chemical reactivity and lanthanide contraction.

3. **COORDINATION COMPOUNDS:** Introduction, ligands, coordination number, Werner's theory of coordination compounds, Shapes of coordination compounds, valence bond theory, IUPAC nomenclature of mono nuclear coordination compounds, Bonding, isomerism, EAN rule, Importance of coordination compounds in qualitative analysis, extraction of metals, Biological systems (chromo proteins, haemoglobin, chlorophyll structures only).

**UNIT - 10**

1. **GENERAL PRINCIPLES OF METALURGY:** Principles and methods of extraction- concentration, reduction by chemical and electrolytic methods and refining, Occurrence and principles of extraction of copper, zinc, iron and silver. Process of molten electrolysis to extract Al, Mg and Na. Extraction of gold and lead.

2. **PRINCIPLES OF QUALITATIVE ANALYSIS:** Group I to V (only Ag⁺, Hg²⁺, Cu²⁺, Pb²⁺,Bi³⁺, Fe³⁺, Cr³⁺, Al³⁺, Ca²⁺, Ba²⁺, Zn²⁺, Mn²⁺ and Mg²⁺); nitrate, halides (excluding fluoride), sulphate and sulphide.

**UNIT - 11**

1. **ORGANIC CHEMISTRY:** Some basic principles and techniques: General introduction, methods of purification, quantitative and qualitative analysis. Classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond, Inductive effect, electrometric effect,

2. HYDROCARBONS: Classification of hydrocarbons, Alkanes - Nomenclature, isomerism conformations (Ethane and butane), Methods of preparation of Ethane, physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis of ethane, Cycloalkanes: Preparation and properties of cyclohexane, Alkenes: Nomenclature, structure of double bond (ethene), physical properties, methods of preparation of ethylene, physical properties, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markonikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition. Reaction with Baeyer’s reagent. Akynes- Preparations and properties of alkynes. Acidity of alkynes.


UNIT - 12

1. HALOALKANES: Nomenclature, nature of C-X bond, Ethyl chloride and chloroform, preparation, physical and chemical properties, Mechanism of substitution reactions SN1 & SN2 reactions. Reactions of Grignard reagent.

2. HALOARENES: Nature of C - X bond, Chlorobenzene substitution reactions (directive influence of halogen for mono substituted compounds only). Nucleophilic aromatic substitution in haloarenes.

3. ALCOHOLS, PHENOLS AND ETHERS: 
   ALCOHOLS: Nomenclature, methods of preparation of ethyl alcohol, physical and chemical properties (of primary alcohols only), Identification of primary, secondary, tertiary alcohols, Mechanism of dehydration. Uses of some important compounds - methanol and ethanol

   PHENOLS: Nomenclature, methods of preparation of phenol, Physical and chemical properties, Acidic nature of phenol, Electrophilic substitution
reactions, Uses of phenols. Comparison of acidic nature of substituted phenols.

**ETHERS:** Nomenclature, Methods of preparation of diethyl ether, physical and chemical properties, uses.
UNIT - 13

1. ALDEHYDES, KETONES AND CARBOXYLLIC ACIDS:


CARBOXYLIC ACIDS: Nomenclature, acidic nature, Methods of preparation of acetic acid, Physical and chemical properties, Uses. Comparison of acidic strength of aliphatic and aromatic acids. Preparations and properties of Benzoic acid.

2. ORGANIC COMPOUNDS CONTAINING NITROGEN

Preparation and properties of Nitro compounds.

AMINES: Nomenclature, Classification, Structure, methods of preparation of aniline, physical and chemical properties, Uses, Identification of primary, secondary and tertiary amines and aromatic amine (Aniline). Comparison of basic strength of aliphatic amines and substituted anilines.

DIAZONIUM SALTS: Preparation, Chemical reactions and importance in synthetic organic chemistry, Uses of azodyes. Azo Coupling reactions of diazonium salts of aromatic amines.

3. PRACTICAL ORGANIC CHEMISTRY: Detection of elements (N, S, Halogens); detection and identification of the following functional groups: alcoholic and phenolic, aldehyde and ketone, carboxyl, amino and nitro. Chemical methods of separation of mono-functional organic compounds from binary mixtures.
UNIT - 14

1. POLYMERS: Classification of polymers, addition, condensation, copolymerization, Natural rubber, vulcanization of rubber, synthetic rubber, molecular weights of polymers – number average and weight average molecular weights (definitions only). Bio - polymers, bio-degradable polymers, Some commercially important polymers like polythene, nylon, polyesters and Bakelite.

2. BIOMOLECULES:
   CARBOHYDRATES: Classification (aldoses and ketoses), Monosaccharides (glucose and fructose), Oligosaccharides (sucrose, lactose, maltose), Polysaccharides (starch, cellulose, glycogen) and Importance.

   AMINOACIDS AND PROTEINS: Elementary idea of amino acids, peptide, Polypeptides, proteins Primary structure, secondary structure, tertiary structure and quaternary structures (qualitative ideas only). Denaturation of proteins, enzymes.

   VITAMINS: Classification, Functions in bio systems.


UNIT – 15

1. CHEMISTRY IN EVERYDAY LIFE: Uses of chemicals in medicine: Analgesics - narcotics (morphine, codeine), Non- narcotics (Asprin, Ibuprofen); Antipyretic (analgin, Phenacetin, paracetamol), Tranquilizers (barbituric acid, luminal, secpnal, valium, serotonin), Antiseptics(chioroxylenol, bithional), disinfectants (formalin, formaldehyde), Anti-microbials (lysozyme, lactic acid, hydrochloric acid in stomach). Antifertilitydrugs, Antibiotics (pencillin, chloramphenicol, sulphadiazine), Antacids (omeprazole, lansoprazole), antihistamines (histidine), Chemicals in food preservatives (sodium benzoate, potassium metabisulphite etc.), Artificial sweetening agents (aspartame, alitane, sucralose).

2. ENVIRONMENTAL CHEMISTRY: Definition of terms: Air, water and soil pollution. Oxides of carbon - carbon monoxide, Oxides of Sulphur and Nitrogen, Chloro Fluoro Carbons, Chemical reactions in atmosphere, smogs, major atmospheric pollutants, acidrains, Ozone and its reactions, effects of depletion of ozone layer. Green house effect and global warming, Pollution
due to industrial wastes, Green chemistry as an alternative tool for reducing pollution.

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