

LESSON PLAN (FROM July 2025 TO November 2025)

Class: B.Sc. I- Ist Sem

Subject : Chemistry

Paper: Chemistry – I [Discipline Specific Course (DSC)]

Code: : C24CHE101T

Month	Contents
July 2025	Atomic Structure Dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg's uncertainty principle, Quantum mechanics. Time independent Schrodinger equation (Derivation Excluded), Significance of Ψ and Ψ^2 , Normal and orthogonal wave functions, Concept of atomic orbitals, Significance of quantum numbers, shapes of <i>s</i> , <i>p</i> and <i>d</i> orbitals, Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals.
August 2025	Structure and Bonding Localized and delocalized chemical bond, Van der Waals interactions, Concept of resonance and its applications, Hyperconjugation, Inductive effect, Electromeric effect and their comparison. Mechanism of Organic Reactions Curved arrow notation, homolytic and heterolytic bond fission, Types of reagents: electrophiles and nucleophiles. Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization. Reactive intermediates: Carbocations, Carbanions, Free radicals and Carbenes (structure & stability).
September 2025	Stereochemistry Type of Stereoisomers, Conformations with respect to ethane, butane and cyclohexane. Optical isomerism, Elements of symmetry, Concept of chirality (upto two carbon atoms). Enantiomerism, Diastereomerism, Threo and erythro diastereomers and Meso compounds.; Configuration: (relative and absolute), sequence rules D and L; R and S (for upto 2 chiral carbon atoms) system of nomenclature; Geometrical isomerism; <i>cis</i> - <i>trans</i> nomenclature; and <i>E/Z</i> Nomenclature (for up to two C=C systems)
October 2025	Gaseous State Kinetic theory of gases and derivation of the kinetic gas equation. Maxwell's distribution of velocities and energies (Graphic representation - derivation excluded), Temperature dependence of these distributions, Most probable velocity, Average velocity and Root Mean Square Velocity (Derivations excluded), Relationship among three types of velocities. Collision diameter, Collision number, Collision frequency and Mean free path (with Derivations).
November 2025	Deviation of real gases from ideal behaviour, Compressibility factor, Causes of deviation, Derivation of Van der Waal's Equation of State, its application in the calculation of Boyle's temperature Back log of chapter if any, discussion and problems to be taken

Meenalini
24/7/25

LESSON PLAN (FROM July 2025 TO November 2025)

Class: B.Sc. I- Ist Sem

Subject : Chemistry

Paper: Basic Chemistry – I [Minor Course (MIC)]

Code: C24MIC131T

Month	Contents
July 2025	Covalent Bond Valence bond theory approach, Various type of hybridisation and shapes of simple inorganic molecules and ions with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements BeF_2 , BF_3 , CH_4 .
August 2025	Covalent Bond Various type of hybridisation and shapes of simple inorganic molecules and ions with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements (PF_5 , SF_6 , IF_7 , SO_4^{2-} , ClO_4^- , NO_3^-), Valence Shell Electron Pair Repulsion (VSEPR) theory to NH_3 , H_3O^+ , SF_4 , ClF_3 , H_2O , SnCl_2 , ClO_3^- and ICl_2^- .
September 2025	Alkanes Nomenclature, Classification of carbon atoms in alkanes and its structure. Isomerism in alkanes.
October 2025	Alkanes Methods of formation: Wurtz reaction, Corey-House reaction. Kolbe electrolytic reaction, and decarboxylation of carboxylic acids.
November 2025	Alkanes Mechanism of free radical halogenation of alkanes: reactivity and selectivity. Back log of chapter if any, discussion and problems to be taken

Munafawi
24/7/25

LESSON PLAN (July 2025 TO November 2025)

CLASS: B.Sc. II, Sem IIIrd

Subject: Chemistry (DSC)

Paper: Chemistry – III

Code: C24CHE301T

Month	Contents
July 2025	Transition Elements (3d series) General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Fe and Cu.
August 2025	Lanthanoids and Actinoids Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only). Alkyl and aryl halides Alkyl Halides Preparation: From Alkenes and Alcohols, Reactions: Nitrite and Nitro formation, Nitrile and isonitrile formation, Williamson's ether synthesis. Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. Aryl Halides Preparation (Chloro, bromo and iodo-benzene case): From phenol, Sandmeyer & Gattermann reactions. Chemical reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by – OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $\text{NaNH}_2/\text{NH}_3$). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, vinyl and aryl halides.
September 2025	Alcohols and Phenols Alcohols Preparation: Preparation of 1°, 2° and 3° alcohols using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones and esters. Acidic nature reactions: With sodium, HX (Lucas test), Esterification, Oxidation (with PCC and acidic dichromate). Phenols Preparation: From Cumene, diazonium salts and Grignard reagent. Acidic nature, Chemical reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Claisen rearrangement, Fries rearrangement and Schotten-Baumann Reaction, Kolbe's reaction (with mechanism).
October 2025	Conductance and Conductivity Introduction, Equivalent and Molar conductivity and their variation with dilution for weak and strong electrolytes, Kohlrausch's law of independent migration of ions, Transport number, Ionic mobility, Applications of conductance measurements: Determination of degree of ionization of weak electrolyte, Solubility and Solubility products of sparingly soluble salts, Ionic product of water.
November 2025	Conductometric titrations (only acid-base): Concept of pH and pKa, buffer solution, buffer action, Henderson-Hasselbalch equation. Oral Class tests Revision of topics Students Queries to be solved

M. S. Maham

LESSON PLAN (July 2025 TO November 2025)

CLASS: B.Sc. II, Sem IIIrd

Subject: Chemistry (Minor Course)

Paper: Basic Chemistry – III

Code: C24MIC331T

Month	Contents
July 2025	Periodic table and Properties Classification of periodic table: s, p, d and f blocks, Periodic properties-atomic and ionic radii, ionization energy,
August 2025	Periodic table and Properties electron affinity and electronegativity- trend in periodic properties (in s and p-block elements) Mechanism of Organic Reactions Curved arrow notation, Homolytic and heterolytic bond fission, Types of reagents: electrophiles and nucleophiles. Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization. Reactive intermediates: Carbocations, Carbanions, Free radicals and Carbenes (structure & stability).
September 2025	Ionic Equilibria Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect.
October 2025	Van der Waals forces and Hydrogen Bonding Brief discussion of various types of Van der Waals forces. Hydrogen Bonding – Definition, types
November 2025	Van der Waals forces and Hydrogen Bonding effects of hydrogen bonding on properties of substances, Applications. Oral Class tests Revision of topics Students Queries to be solved

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LESSON PLAN (July 2025 TO November 2025)

CLASS: B.Sc.III 5thSem

Paper Code: CCL-503(ii)

Paper: Chemistry of Main Group Elements -I

Month	Contents
July 2025	Acids and bases : Bronsted- Lowry concepts, conjugate acids and bases, relative strengths of acids and bases, Effects of substituent and solvent on relative strength of acids and bases Differentiating and levelling solvents, Lewis acid–base concept, classification of Lewis acids and bases
August 2025	Lux-Flood concept and solvent system concept, hard and soft acids and bases concept and application of HSAB process General principles and metallurgy: Chief modes of occurrence of metals based on standard electrode potentials, Ellingham diagrams for reduction of metal oxides using carbon monoxide as reducing agents Hydrometallurgy with reference to cyanide process for gold and silver, methods of purification of metals like (Al, Pb, Ti, Fe) Methods of purification of metals like (Cu, Ni, Zn, Au), electrolytic refining, zone refining, van Arkel-de Boer process , Parting, Mond's and Kroll process
September 2025	s and p block elements: Periodicity with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy Periodicity of s and p block elements with respect to electro negativity (Pauling scale). General characteristics of s block elements like density, melting and boiling point, flame colour and reducing nature Oxidation states of s and p block element, inert pair effects, diagonal relationship, Anomalous behaviour of first member of s and p block groups, allotropy in C, P and S
October 2025	Complex forming tendency of s block elements and preliminary idea of crown ethers and cryptates Structure of basic beryllium acetate, salicylaldehyde/ acetylacetonate complexes of group 1 metals Solutions of alkali metals in liquid ammonia and their properties, Common features such as ease of formation, solubility and stability of oxides, peroxides, superoxides of s block elements
November 2025	Common features such as ease of formation, solubility and stability of sulphate and carbonates of s block elements, Revision and discussion on problems

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LESSON PLAN (July 2025 TO November 2025)

CLASS: B.Sc. III-5thSem

PAPER CODE: CCL-504 (ii)

PAPER: Chemistry of Main Group Elements II

Month	Contents
July 2025	Structure, bonding and properties (acidic/ basic nature, oxidizing/ reducing nature and hydrolysis and their applications in industrial and environmental chemistry wherever applicable: Diborane and concept of multicentre bonding
August 2025	Structure, bonding and properties of hydrides of Groups 13,14,15, 16, 17 Structure, bonding and properties of Oxides of N and P Oxoacids of P, S and Cl. Halides and oxohalides of P and S (PCl_3 , PCl_5 , SOCl_2 and SO_2Cl_2) Interhalogen compounds, A brief idea of pseudohalides Discussion and problems related to unit 1 and 2
September 2025	Noble gases: Rationalization of inertness of noble gases, clathrates Preparation and properties of XeF_2 , XeF_4 , XeF_6 Bonding in these compounds using VBT shapes of noble gas compounds using VSEPR Theory and related problems
October 2025	Revision and discussion on problems of Noble Gases Inorganic Polymers: Types of inorganic polymers and comparison with organic polymers, structural features, Classification and important applications of silicates Synthesis, structural features and applications of silicones Borazines – preparation, properties and reactions.
November 2025	Cyclophosphazenes – preparation, properties and reactions. Bonding in $(\text{NPCl}_2)_3$ Revision and discussion on problems Oral class Tests

M. S. Lalani

LESSON PLAN (July 2025 TO November 2025)

B.Sc. III, Sem Vth

Paper: Fuel Chemistry (SEC)

Code: CCS 505 (ii)

Month	Contents
July 2025	Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value.
August 2025	Coal: Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas—composition and uses Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke Coal gasification, Coal liquefaction and Solvent Refining. Revision and discussion on problems on Unit-1 and 2 Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications. Fractional Distillation (Principle and process),
September 2025	Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels Fuel from waste, synthetic fuels (gaseous and liquids) clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.
October 2025	Revision and discussion on problems on Unit-3 Lubricants- Classification of lubricants, lubricating oils (conducting and nonconducting) Solid and semisolid lubricants Synthetic lubricants, Properties of lubricants (viscosity index, cloud point, pore point)
November 2025	Determination of lubricants (viscosity index, cloud point, pore point) Revision and discussion on problems on Unit-4

Meenakshi