Government College for Women, Hisar

Lesson Plan (2024-2025)

Discipline Specific Course

Name: VIRENDER SINGH

Department: Chemistry **Class: BSc- 1ST (NM+MED) 1st Sem**

Paper Code-C24CHE101T/C24MIN131T

S.No	Date	Topics
1	**AUG 2024**	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 Ψ2 , Normal and orthogonal wave functions, Concept of atomic orbitals, Significance of quantum numbers, shapes of s, p and d orbitals, Rules for filling electrons in various orbitals, Electronic configurations of the atoms, Stability of half-filled and completely filled orbitals
2	**SEPT 2024**	Stereochemistry Type of Streoisomers, 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 diasteromers 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; cis - trans nomenclature; and E/Z Nomenclature (for up to two C=C systems)
3	**OCT 2024**	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)
4	**NOV 2024**	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), 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

Government College for Women, Hisar

Lesson Plan (2024-2025)

Minor Course

Name: VIRENDER SINGH

Department: Chemistry **Class: BSc- 1ST Computer science 1st Sem**

Paper Code-: C24MIC131T

S.No	Date	Topics
1	AUG 2024	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 (BeF2, BF3, CH4, PF5, SF6, IF7, SO4 -2 , ClO4 -
2	SEPT 2024	Valence Shell Electron Pair Repulsion (VSEPR) theory to NH3, H3O+ , SF4, ClF3, H2O, SnCl2, ClO3 - and ICl2 -)
3	OCT 2024	Alkanes Nomenclature, Classification of carbon atoms in alkanes and its structure. Isomerism in alkanes. Methods of formation: Wurtz reaction, Corey-House reaction. Kolbe electrolytic reaction, and decarboxylation of carboxylic acids. Mechanism of free radical halogenation of alkanes: reactivity and selectivity
4	NOV 2024	Kolbe electrolytic reaction, and decarboxylation of carboxylic acids. Mechanism of free radical halogenation of alkanes: reactivity and selectivity

Government College for Women, Hisar

Lesson Plan (2024-2025)

Skill Enhancement Course

Name: VIRENDER SINGH

Department: Chemistry **Class: BSc- 1ST Non med 1st Sem**

Paper Code- : **C24SEC128T (SEC)**

Sr.No	Date	Topics
1	**AUG 2024**	Chemical Labeling and basic chemical concepts: Chemical labeling and Chemical concepts related to solution preparation: Equivalent mass, molar mass, specific gravity, concentration (Normality, Molarity, Molality, %w/v, %w/w, %v/v, ppm solutions).
2	**SEPT 2024**	Equivalent mass, molar mass, specific gravity, concentration (Normality, Molarity, Molality, %w/v, %w/w, %v/v, ppm solutions).
3	**OCT 2024**	Solution Preparation and Purification of compounds: Standardization of solutions using Volumetric Titrations, Primary and Secondary standards. Indicators and preparation of indicator solutions:
4	**NOV 2024**	Phenolphthalein, Starch Solution, Eriochrome Black T, N-Phenylanthranilic acid Buffer Solutions, Types of Buffer Solutions, Henderson Hasselbalch Equation, Preparation and determination of pH of buffer solutions, Complexometric Titrations using EDTA. Purification of compounds through distillation, crystallization and sublimation

Government College for Women, Hisar
Chemistry Department
Lesson Plan (2024-2025)
(Odd semester, Session 2024-25)

NAME OF TEACHER: Dr. PRIYANKA

CLASS: B.Sc. III NON MEDICAL (V^{th} SEM)

PAPER-I: PAPER: CCL-504(II) CHEMISTRY OF MAIN GROUP ELEMENTS-II

S.No	MONTH	Topics
1	JULY 2024	Structure, bonding and properties (acidic/ basic nature, oxidizing/ reducing nature and hydrolysis of the following compounds and their applications in industrial and environmental chemistry wherever applicable
2	AUGUST 2024	Diborane and concept of multicentre bonding, hydrides of Groups 13 (EH3), 14, 15, 16 and 17. Oxides of N and P, Oxoacids of P, S and Cl. Solutions Halides and oxohalides of P and S (PCl_3, PCl_5, $SOCl_2$ and SO_2Cl_2) Interhalogen compounds. A brief idea of pseudohalides
3	SEPTEMBER 2024	Noble gases: Rationalization of inertness of noble gases, clathrates, preparation and properties of XeF_2, XeF_4 and XeF_6 ,bonding in these compounds using VBT and shapes of noble gas compounds using VSEPR.
4	OCTOBER 2024	Inorganic Polymers: Types of inorganic polymers and comparison with organic polymers, structural features, classification and important applications of silicates. applications of silicones.
5	NOVEMBER 2024	Borazines and cyclophosphazenes – preparation, properties and reactions. Bonding in $(NPCl_2)_3$.

Government College for Women, Hisar
Chemistry Department
Lesson Plan (2024-2025)
(Odd semester, Session 2024-25)

NAME OF TEACHER: Dr. PRIYANKA

PAPER-II: FUEL CHEMISTRY CCL 505 (SEC) FUEL CHEMISTRY

B.Sc. III NON MEDICAL (Vth SEM)

MONTH	Topics
JULY 2024	Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value.
AUGUST 2024	Coal:Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas.water gas—composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining. Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications.
SEPTEMBER 2024	Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels.
OCTOBER 2024	Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels.
NOVEMBER 2024	Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene. Lubricants: Classification of lubricants, lubricating oils (conducting and nonconducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination REVISION

Government College for Women, Hisar
Chemistry Department
Lesson Plan (2024-2025)
(Odd semester, Session 2024-25)

NAME OF TEACHER: Dr. PRIYANKA

CLASS: B.A IST MDC (IST SEM)

Month	Topics
AUGUST 2024	**Chemistry of Oils** Introduction to oils and fats, classification, common fatty acids present in oils and fats,
SEPTEMBER 2024	Difference between fats and oils, Saponification value, acid value and iodine value (Only definitions). Applications and uses of different oils and fats
OCTOBER 2024	**Chemistry of Dyes** Definition; Colour and constitution; Classification on the basis of origin & application methods, applications and uses of the following dyes: Methyl orange (azo dye);
NOVEMBER 2024	Malachite green (tiphenylmethane dye), Phenolphthalein (Phthalein dye), Alizarin (anthraquinone dye), Indigo dye.

Government College for Women, Hisar
Lesson Plan (2024-2025)

Name: Dr. Satyender Kumar Yadav

Department: Chemistry **Class: BSc- IIIrd Med. & NM (VthSem)**

Paper: CCL-503 Chemistry of Main Group Elements, Theories of Acids and Bases-I

S.No	Date	Topics
1	August 2024	Acids and Bases: Bronsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.Hard and soft acids and bases (HSAB concept), applications of HSAB process.
2	September 2024	General Principles of Metallurgy: Chief modes of occurrence of metals based on standard electrode potentials, Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agents. Hydrometallurgy with reference to cyanide process for gold and silver. Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn, Au): electrolytic refining, zone refining, van Arkel-de Boer process, Parting Process, Mond's process and Kroll Process.
3	October 2024	s- and p-Block Elements Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy, electronegativity (Pauling scale). General characteristics of s-block metals like density, melting and boiling points, flame colour and reducing nature. Oxidation states of s- and p-block elements, inert-pair effect, diagonal relationships and anomalous behaviour of first member of each group. Allotropy in C, P and S.
4	November 2024	Complex forming tendency of s block elements and a preliminary idea of crown ethers and cryptates, structures of basic beryllium acetate, salicylaldehyde/ acetylacetonato 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, sulphates and carbonates of s-block metals.

Government College for Women, Hisar
Lesson Plan (2024-2025)

Name: Rakesh Kumar
Department: Chemistry
Class: BSc- 1st Non Med. & Med. (1st Sem)

Sr.No	Date	Topics
1	17th AUG 2024	Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure **Carboxylic acids and their derivatives** Carboxylic acids (aliphatic and aromatic) Preparation: Acidic and Alkaline hydrolysis of esters. Reactions: Hell-Vohlard-Zelinsky Reaction. Carboxylic acid derivatives (aliphatic): (Upto 5 carbons) Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their interconversion. Reactions: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation. **Amines and Diazonium Salts** Amines (Aliphatic and Aromatic): (Upto 5 carbons) Preparation: from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann-Bromamide reaction. Reactions: Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO2, Schotten-Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation. Diazonium salts: Preparation: from aromatic amines. Reactions: conversion to benzene, phenol, dyes.
2	SEPT 2024	**Amino Acids, Peptides and Proteins:** Preparation of Amino Acids: Strecker synthesis using Gabriel's phthalimide synthesis. Zwitter ion, Isoelectric point and Electrophoresis. Reactions of Amino acids: ester of -COOH group, acetylation of -NH2 group, complexation with Cu2+ ions, ninhydrin test. Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Determination of Primary structure of Peptides by degradation Edmann degradation (N-terminal) and C-terminal (thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides(upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis. **Carbohydrates:** Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending

		in monosaccharides. Structure of disacharrides (sucrose, cellobiose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation.
3	**OCT 2024**	**Solutions** Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law-non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. Distillation of solutions. Azeotropes. Colligative properties of solutions. Thermodynamic derivations of relation between amount of solute and elevation in boiling point and depression in freezing point. Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Immiscibility of liquids-Principle of steam distillation. **Phase Equilibrium** Phases, components and degrees of freedom of a system, criteria of phase equilibrium.Gibbs Phase Rule and its thermodynamic derivation. Derivation of Clausius - Clapeyron equation and its importance in phase equilibria. Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points (lead-silver, and Na-Konly). **Conductance** Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Transference 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, hydrolysis constant of a salt. Conductometric titrations (only acid-base). Concept of pH and pka, buffer solution, buffer action, Handerson Hazel Blac equation.
4	**NOV 2024**	**Electrochemistry** Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: AG, AH and AS from EMF data. Calculation of equilibrium constant from EMF data. Concentration cells with transference and without transference. Liquid junction potential and salt bridge. pH determination using hydrogen electrode and quinhydrone electrode. Potentiometric titrations-qualitative treatment (acid-base and oxidation-reduction only).

Government College for Women, Hisar
Chemistry Department
Lesson Plan (2024-2025)
(Odd semester, Session 2024-25)

NAME OF TEACHER: Dr. Rakesh Kumar

CLASS: B. Com. Ist MDC (Ist S)

Month	Topics
AUGUST 2024	**Chemistry of Oils** Introduction to oils and fats, classification, common fatty acids present in oils and fats,
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