Summary of Lesson Plans of College Faculty

Name of College: Govt. College for Girls Cheeka, Kaithal

Academic Session: 2024-2025 Semester: Even

Name of Asstt./Ass. Prof: Mr. Dharam Singh

Class: B.Sc. Ist year (2nd sem) Chemistry

Subject Lesson Plan: From Feb 2025-May 2025

Month	Topics
Feb	**Alkanes and Cycloalkanes** Nomenclature, classification of carbon atoms in alkanes and its structure. Isomerism in alkanes, sources. Methods of formation: Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids, physical properties.
	Mechanism of free radical halogenation of alkanes: reactivity and selectivity. Nomenclature of Cycloalkanes, Baeyer's strain theory and its limitations, theory of strainless rings.
March	**Alkenes** Nomenclature of alkenes and its structure. Methods of formation: dehydration of alcohols, dehydrohalogenation of alkyl halide, Hofmann elimination and their mechanism. The Saytzeff rule and relative stabilities of alkenes. Chemical reactions: electrophilic and free radical additions, addition of halogens, halogen acids, hydroboration–oxidation, oxymercuration-reduction, ozonolysis and hydration. Markownikoff's rule of addition.
	Hydrogen Bonding and Van der Waals forces Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application Brief discussion of various types of Van der Waals forces.
	Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators).
	Semiconductors – Introduction, types, and applications.
April	**Chemical Kinetics** Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction, integrated rate expression for zero, first, Half-life period of a reaction, Arrhenius equation.
	Distribution Law Nernst distribution law – its thermodynamic derivation, Nernst distribution law after association and dissociation of solute in one of the phases, applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride

May	**Covalent Bond** valence bond theory approach, shapes of simple inorganic molecules and ions based on valence shell electron pair repulsion (VSEPR) theory and hybridization with suitable examples of linear, trigonal planar, tetrahedral, trigonalbipyramidal and octahedral arrangements. Molecular orbital theory of homonuclear (N_2, O_2) and heteronuclear (CO and NO) diatomic molecules, dipole moment and percentage ionic character in a covalent bond.
	Ionic Solids Ionic structures (NaCl, CsCl, ZnS (Zinc blende), CaF_2) size effects, radius ratio rule and its limitations, concept of Lattice energy, Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic solids Polarizing power and Polarisability of ions, Fajan's rule.

Summary of Lesson Plans of College Faculty

Name of College: Govt. College for Girls Cheeka, Kaithal

Academic Session: 2024-2025 Semester: Even

Name of Asstt./Ass. Prof: Mr. Dharam Singh

Class: B.Sc. 2nd year (4th sem) Chemistry

Subject Lesson Plan: From Feb 2025-May 2025

Month	Topics
Feb	**Thermodynamics-I** First law of thermodynamics: statement, concepts of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule– Thomson coefficient for ideal gas and real gas and inversion temperature.
	Calculation of w, q, dU&dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.
March	**Alcohols** Monohyric alcohols: nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids, and esters. Hydrogen bonding, Acidic nature, Reactions of alcohols.
	Phenols Nomenclature, structure, and bonding. Preparation: Cumenehydroperoxide method, from diazonium salts, physical properties, and acidic character. Chemical Reactions: — electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe's reaction.
	Aldehydes and Ketones Nomenclature and structure of the carbonyl group. Preparation: oxidation of alcohols, from acid chlorides and from nitriles, Comparison of reactivities of aldehydes and ketones. Mechanism of nucleophilic additions to carbonyl group: benzoin, aldol, Perkin and Knoevenagel condensations.
	Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction, Baeyer–Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen and Wolff-Kishner reductions
April	**Chemistry of d-Block elements** definition of transition elements, General characteristic properties of d-Block elements, Comparison of ionic radii 3d, 4d and 5d series elements, magnetic properties, Stability of various oxidation states and Latimer and Frost diagrams, Structure of some compounds of transition elements- TiO_2, $VOCl_2$, $FeCl_3$, $CuCl_2$ and $Ni(CO)_4$.

	Chemistry of f-Block elements Lanthanide contraction, oxidation states, magnetic properties, complex formation, colour and ionic radii. Actinides: General characteristics of actinides, Transuranic elements, comparison of properties of Lanth and actinides with transition elements.
May	**Theory of Qualitative and Quantitative Analysis** Chemistry of analysis of various groups of basic and acidic radicals, chemistry of identification of acid radicals in typical combination, common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates.
	Chemical Equilibrium Concept of Equilibrium constant, Temperature dependence of equilibrium constant, Clausius–Clapeyron equation and its applications.

Summary of Lesson Plans of College Faculty

Name of College: Govt. College for Girls Cheeka, Kaithal

Academic Session: 2024-2025 Semester: Even

Name of Asstt./Ass. Prof: Mr. Dharam Singh

Class: B.Sc. 3rd year (6th sem) Chemistry

Subject Lesson Plan: From Feb 2025-May 2025

Month	Topics
Jan	Solutions , dilute solutions and colligative properties Ideal and non ideal solutions, methods of expressing concentration of solutions, Raoults law , colligative properties: relative lowering in vapour pressure, elevation in boiling point .
	Depression in freezing point, calculation of molar mass of non volatile solute from colligative properties , abnormal molar masses
Feb	**Amino acids, peptides and protiens** Isoelectric point and electrophoresis, Preparation of amino acids Structure, nomenclature, classification of proteins and peptides, peptide structure determination End group analysis, selective hydrolysis, classical peptide, solid phase peptide synthesis
	Organic synthesis via enolates acidity of α-hydrogen, Alkylation of diethyl malonate Alkylation of ethyl acetoacetate, Synthesis of ethyl acetoacetate, Keto-enol tautomerism of ethyl acetoaetate
	Polymers Addition, free radical, ionic, Zieglar-Natta polymerization
	Vinyl polymers, condensation polymerization, polyester, polyamides, Phenol-formaldehydes resins, natural and synthetic rubber
March	Heterocyclic compounds: molecular orbital picture and aromatic character, Method of synthesis of pyrrole Method of synthesis of furan, synthesis of thiophene, Electrophilic substitution reaction of pyrrole Electrophilic substitution reaction of thiophene and furan, Nucleophilic substitution reaction of pyridine derivative Basicity of pyridine. Piperidine and pyrrole, Introduction to condensed five and six membered heterocycle compounds, Preparation of indole Electrophilic substitution reactions of quinoline and iso-quinoline
	Acids and Bases: Arrhenius, Bronsted-lowry, Lux-flood levelling solvents Solvent system and Lewis concept of acids bases, relative strength of acids and bases Hard and soft acids and bases (HSAB), Applications of HSAB principle. organometallic chemistry: Definition, classification and nomenclature of organometallic compounds, preparation, properties and bonding of alkyls of Li, Al, Hg and Sn, concept of hapticity of organic ligand, Structure and bonding in ethylenic complexes

April	Bio inorganic chemistry: Metal ions present in biological system, classification on the basis of action (essential, non-essential, trace, toxic Metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of Na^{+}, K^{+}, Ca^{+2}, Mg^{+2} ions, Cooperative effect, Bohr effect Photochemistry : difference between thermal and photochemical processes, laws of photochemistry, Stark-Einstien law Jablonski diagram qualitative description of fluorescence, phosphorescence, non radiative processes, quantum yield Phase equilibrium statement and meaning of phase, component and degrees of freedom