

**LESSON-PLAN****(Session 2024-25) Even Semester****Name of Professor:****Mrs .SEEMA****Subject:****Chemistry****Class:****B.Sc.(N.M.) 4<sup>th</sup> Semester****Subject/Paper:****Chemistry Major**

<b>Sr. No.</b>	<b>Days</b>	<b>Topics to be covered</b>	<b>Remarks if any</b>
<b>14.</b>	<b>08-02-2025-16-02-2025</b>	Definition of transition elements, General characteristic properties of d-Block elements, Comparison of ionic radii 3d, 4d and 5d series elements, magnetic properties,	
<b>15.</b>	<b>17.02.2025 to 25.02.2025</b>	Stability of various oxidation states and Latimer and Frost diagrams, Structure of some compounds of transition elements- $\text{TiO}_2$ , $\text{VOCl}_2$ , $\text{FeCl}_3$ , $\text{CuCl}_2$ and $\text{Ni(CO)}_4$ .	
<b>16.</b>	<b>26-02-2025-08-03-2025</b>	Lanthanide contraction, oxidation states, magnetic properties, complex formation, colour and ionic radii. Actinides: General characteristics of actinides, Transuranic elements, comparison of properties of Lanthanides and actinides with transition elements.	<b>1<sup>st</sup> ASSIGNMENT &amp; TEST</b>
<b>17.</b>	<b>09-03-2025-16-03-2025</b>	Holi Break	
<b>18.</b>	<b>17.03.2025 to 25.03.2025</b>	<b>Theory of Qualitative and Quantitative Analysis</b>  Chemistry of analysis of various groups of basic and acidic radicals, chemistry of identification of acid radicals in typical combination,	
<b>19.</b>	<b>26-03-2025 to 07-04-2025</b>	Common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates.	
<b>20.</b>	<b>08.04.2025 to 16.04.2025</b>	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.	
21.	17-04-2025 to 25-04-2024	Second law of thermodynamics, Carnot cycles and its efficiency, Concept of entropy, entropy as a function of V & T, entropy as a function of P & T. Concept of Equilibrium constant, Temperature dependence of equilibrium constant, Clausius-Clapeyron equation and its applications.	2 <sup>ND</sup> ASSIGNMENT & TEST
22.	26.04.2025 to 04.05.2025	Monohyric alcohols: nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids, and esters. Hydrogen bonding, Acidic nature, Reactions of alcohols. Phenol: Nomenclature, structure, and bonding. Preparation: Cumenehydroperoxide method, from diazonium salts, physical properties, and acidic character.	
23.	05.05.2025 to 12.05.2025	Chemical Reactions: — electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe's reaction..	
24.	13.05.2025 to 19.05.2025	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.	
25.	20.05.2025 to 31.05.2025	Wittig reaction. Mannich reaction, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen and Wolff-Kishner reductions.  Revision, presentation and test	
26.	01.06.2025	Examination	

- Vacation as per university calendar
- Assignments and unit test will be taken as per schedule.

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H2/25

Ms. Seema  
Assistant Professor  
of Chemistry



**LESSON-PLAN****(Session 2024-25) Even Semester**

**Name of Professor:** Mrs .SEEMA  
**Subject:** Chemistry  
**Class:** B.Sc.(N.M.) 2<sup>nd</sup> Semester  
**Subject/Paper:** Chemistry Minor

Sr. No.	Days	Topics to be covered	Remarks if any
1.	08-02-2025-16-02-2025	Atomic and ionic radii, Ionization energy Electron affinity and electronegativity definition,	
2.	17.02.2025 to 25.02.2025	Trend in periodic table, effective nuclear charge, Slater's rules.	
3.	26-02-2025-08-03-2025	Stoichiometric and Non-stoichiometric defects in crystals,	1 <sup>st</sup> ASSIGNMENT & TEST
4.	09-03-2025-16-03-2025	Holi Break	
5.	17.03.2025 to 25.03.2025	Lattice energy and Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic solids	
6.	26-03-2025 to 07-04-2025	Polarizing power and Polarisability of ions, Fajan's rule	
7.	08.04.2025 to 16.04.2025	<b>Structure and Bonding in Organic Compounds</b> Localized and delocalized chemical bond, Van der Waal's interactions	
8.	17-04-2025 to 25-04-2025	Resonance: conditions and resonance effect, hyperconjugation, inductive effect	2 <sup>ND</sup> ASSIGNMENT & TEST
9.	26.04.2025 to 04.05.2025	Electromeric effect & their comparison, Kinetic theory of gases.	

10.	05.05.20 25 to 12.05.20 25	Calculation of root mean square velocity, Collision diameter.	
11.	13.05.20 25 to 19.05.20 25	Collision number, collision frequency and mean free path (derivations excluded).	
12.	20.05.20 25 to 31.05.20 25	Revision, presentation and test	
13.	01.06.20 25	Examination	

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*Sanjeev Kumar*  
21/25

Ms. *Sema*  
Assistant Professor  
of chemistry.



**LESSON-PLAN****(Session 2024-25) Even Semester****Name of Professor:****Mrs .SEEMA****Subject:****Chemistry****Class:****B.Sc.(N.M.) 2<sup>nd</sup> Semester****Subject/Paper:****Chemistry Major**

Sr. No.	Days	Topics to be covered	Remarks if any
1.	08-02-2025-16-02-2025	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, square planar, tetrahedral, trigonalbipyramidal and octahedral arrangements.	
2.	17-02-2025 to 25-02-2025	Molecular orbital theory of homonuclear (N <sub>2</sub> , O <sub>2</sub> ) and heteronuclear (CO and NO) diatomic molecules, dipole moment and percentage ionic character in covalent bond. Ionic Solid.	
3.	26-02-2025-to 03-03-2025	Ionic structures (NaCl, CsCl, ZnS (Zinc blende), CaF <sub>2</sub> ) 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.	<b>1<sup>st</sup> ASSIGNMENT &amp; TEST</b>
4.	04.03.2025 to 08.03.2025	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	
5.	09.03.2025 to 16.03.2025	Holi Break	
6.	17-03-2025 to 25-03-2025	Nernst distribution law – its thermodynamic derivation, Nernst distribution law after association and dissociation of solute in one of the phases, of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride	
7.	26-03-2025 to 07-04-2025	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.	
8.	08.04.2025 to 16.04.2025	Mechanism of free radical halogenation of alkanes: reactivity and selectivity. Nomenclature of Cycloalkanes, Baeyer's strain theory and its limitations, theory of strain less rings.	
9.	17-04- 2024-25- 04-2024	<b>Alkenes:</b> 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.	
10.	26.04.2025 to 04.05.2025	Chemical reactions: electrophilic and free radical additions, addition of halogens, halogen acids, hydroboration-oxidation, oxymercuration-reduction, ozonolysis and hydration. Markownikoff's rule of addition	
11.	05.05.2025 to 12.05.2025	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.	<b>2<sup>ND</sup> ASSIGNMENT &amp; TEST</b>
12.	13.05.2025 to 19.05.2025	<b>Metallic Bond and semiconductors :</b> Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators). Semiconductors – Introduction, types, and applications	
13.	20.05.2025 to 31.05.2025	Revision and Presentation and test	<b>Test II</b>
14.	01.06.2025	EXAMINATION	

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7/2/25

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Ms. Seema  
Assistant Professor  
of chemistry.

## LESSON-PLAN (Session 2024-25) Even Semester

Name of Assistant Professor: Mrs.Seema

Subject: Chemistry

Class: B.Sc. 6<sup>th</sup> Semester

Subject/Paper: Organic,Physical,Inorganic Chemistry

Sr. No.	Days	Topics to be covered	Remarks if any
1.	01-01-2025 to 07-01-2025	Definition, nomenclature and classification of organometallic compounds. Preparation, properties, and bonding of alkyls of Li, Al, Hg, and Sn. Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle, need for statistical thermodynamics, thermodynamic probability.	
2.	08-01-2025 to 15-01-2025	Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulfonamides and sulphaguanidine. Maxwell-Boltzmann distribution statistics.	
3.	16-01-2025 to 22-01-2025	A brief account of metal-ethylenic complexes, mononuclear carbonyls and the nature of bonding in metal carbonyls. Qualitative description of sigma and pi and n molecular orbital (MO) their energy level and respective transitions. Synthetic detergents alkyl and aryl sulphonates. Born Oppenheimer approximation, partition function and its physical significance, Factorization of partition function.	
4.	23-01-2025 to 31-01-2025	Arrhenius, Bronsted - Lowry, the Lux - Flood, Solvent system and Lewis concepts of acids & bases, relative strength of acids & bases, Concept of Hard and Soft Acids & Bases. Interaction of radiation with matter, difference between thermal and photochemical processes.	
5.	01-02-2025 to 8-02-2025	Laws of photochemistry: Grotthus-Draper law, Stark-Einstein law (law of photochemical equivalence) Jablonski diagram depicting various processes occurring in the excited state, Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and	Assignment-I



		chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives.	
6.	09-02-2025 to 16-02-2025	Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to $\text{Ca}^{2+}$ . Nitrogen fixation. qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples)	
7.	17-02-2025 to 25-02-2025	Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed five and six-membered heterocycles. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline.	
8.	26-02-2025 to 03-03-2025	Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes of aldehydes from acid chlorides, advantage of oxidation of alcohols with chromium trioxide (Sarett reagent) pyridiniumchlorochromate (PCC) and pyridinium dichromate., Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution,	Test-I
9.	04-03-2025 to 08.03.25.	Raoult's law, relative lowering of vapour pressure, molecular weight determination, Osmosis law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Acidity of $\alpha$ -hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate.	Presentations
10.	09.03.2025-16.03.2025	Holi Break	



11.	17.03.2025 to 25.03.2025	Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes. Statement and meaning of the terms – phase component and degree of freedom, thermodynamic derivation of Gibbs phase rule.	Assignment-II
12.	26.03.2025 to 07.04.2024	Phase equilibria of one component system –Example – water and Sulphur systems. Classification, of amino acids. Acid-base behavior, isoelectric point and electrophoresis. Preparation of $\alpha$ -amino acids. Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid– phase peptide synthesis. Structures of peptides and proteins: Primary & Secondary structure.	
13.	08.04.2024 to 15.4.2024	Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilverisation of lead Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers.	Test-II
14.	16.04.2025 to 24.04.2025	Condensation or step growth polymerization. Polyesters, poly amides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.	
15.	25.04.2025 to 30.4.2025	Revision and Presentations	

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