**LESSON PLAN (ODD SEMESTER 2023-24 )**

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**ASSISTANT PROFESSOR IN CHEMISTRY**

**GOVERNMENT COLLEGE MOHNA**

**B.Sc. 1st Year (Inorganic Chemistry)**

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| **Month/Week** | **First week** | **Second week** | **Third week** | **Fourth week** |
| **August** | Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, | Quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals. | Aufbau and Pauli exclusion principles, Hund's multiplicity rule. | Electronic configurations of the elements, effective nuclear charge, Slater’s rules. |
| **September** | Atomic and ionic radii, ionization energy, electron affinity and electronegativity | Valence bond theory and its limitations, directional characteristics of covalent bond, | various types of hybridization and shapes of simple inorganic molecules and ions | MO theoryof heteronuclear (CO and NO) diatomic.molecules, , bond strength and bond energy, |
| **October** | percentage ionic character from dipole moment and electronegativity difference. | Ionic structures (NaCl,CsCl, ZnS(Zinc Blende), CaF2) radius ratio effect and coordination number, limitation of radius ratio rule, | lattice defects, semiconductors, lattice energy (methamtical derivation exc luded) and Born-Haber cycle, | , solvation ene rgy and its relation with solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule |
| **November** | Revision | Revision | Revision | Revision |

**B.Sc. 1st Year (Organic Chemistry)**

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| **Month/Week** | **First week** | **Second week** | **Third week** | **Fourth week** |
| **August** | Localized and delocalized chemical bond, van der Waals in teractions, resonance: conditions, resonance effect and its applications, hyperconjugation, | inductive effect, Electromeric effect & their comparison. Concept of isomerism. Types of isomerism | Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, | chiral and achiral molecules with two stereogenic centres, diastereomers, threo and eryth ro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. |
| **September** | Relative and absolute configuration, sequence rules, R & S systems of nomenclature. Geometric isomerism determination of configuration of geometric isomers. | E & Z system of nomenclature, Conformational isomerism conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds,. | Newman projection and Sawhorse formulae, Difference between configuration and conformation. | Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles |
| **October** | . Types of organic reactions. Energy considerations. Reactive intermediates carbocations, carbanions, free radicals, carbenes , arynes and nitrenes | IUPAC nomenclature of branched and unbranched alkanes , the alkyl group, classi fication of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation, physical properties. | Cycloalkanes nomenclature, synthesis of cycloalkanes and their derivatives – photochemical (2+2) cycloaddition reactions, dehalogenation of -dihalides, pyrolysis of calcium or barium salts of dicarboxylic acids, | Baeyer's strain theory and its limitations., theory of strainless rings |
| **November** | Revision | Revision | Revision | Revision |

**B.Sc. III Year (Inorganic Chemistry)**

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| **Month/Week** | **First week** | **Second week** | **Third week** | **Fourth week** |
| **August** | Limitations of valence bond theory, an elementary idea of crystal-f ield theory, | crystal field split ting in octahedral | crystal field split ting in tetrahedral and square planar complexes | factors affecting the crystal-f ield parameters. |
| **September** | A brief outline of thermodynamic stability of metal complexes and factors affec ting the s tab ility, | substitution reac tions of square planar complexes of Pt(II). | Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. | L-S coupling, correlation of s and eff values, orbital contribution to magnetic moments, |
| **October** | application of magnetic moment data for 3dmetal complexes. | Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series. | Orgel-energy level diagram for d1 and d9 states, | discussion of the electronic spectrum of [Ti(H2O)6]3+ complex ion. |
| **November** | Revision | Revision | Revision | Revision |

**B.Sc. III Year (Organic Chemistry)**

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| **Month/Week** | **First week** | **Second week** | **Third week** | **Fourth week** |
| **August** | Principle of nuclear magnetic resonance, the PMR spectrum,number of signals, peak areas, | equivalent and nonequivalent protons positions of signals and chemical shift,shielding and deshielding of protons, | proton counting,splitting of signals and coupling constants, magnetic equivalence of protons. | Discuss ion of PMR spectra of the molecules |
| **September** | Classification and nomenclature. Monosaccharides, mechanism of osazone formation, inte rconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. | Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose in to mannose. | Formation of glycos ides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. | Mechanism ofmutarotation. Structures of ribose and deoxyribose. |
| **October** | An introduc tion to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination. | Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. O | Organozinc compounds: formation and chemical reactions. | Organolithium compounds: formation and chemical reactions. |
| **November** | Revision | Revision | Revision | Revision |

**B.Sc. II Year (Inorganic Chemistry)**

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| **Month/Week** | **First week** | **Second week** | **Third week** | **Fourth week** |
| **August** | Definition of transition elements, position in the periodic table, General characteristics & properites of Ist transition elements,. | Structures & properties of some compounds of transition elements – TiO2, VOCl2 | Structures & properties of some compounds of transition elements –FeCl3 , | Structures & properties of some compounds of transition elements –, CuCl2 and Ni (CO)4 |
| **September** | General characteristics and properties of the IInd and IIIrd trans ition elements | Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, | Comparison of properties of 3d elements with 4d & 5d elements with reference oxidation state, magnetic and Spectral properties | Comparison of properties of 3d elements with 4d & 5d elements with reference to stereochemistry |
| **October** | Revision | Revision | Revision | Revision |
| **November** | Revision | Revision | Revision | Revision |