

Lesson Plan (2025-26)

Name:- Yogita Sharma

Class: B.A 1st (M.D.C)

Subject:- Chemistry

Semester:-1st

Month	Topics
August	Role of Chemistry and pertained factors in Geographical components: Soil. Water. Air and Toxic elements
September	Solid Chemical waste resources. effects on environment and its management. Chemistry Education role in society for prevention of pollution. Practicals: 1.To determine the pH of river and pond water 2.To measure the conductance of water samples.
October-	Environmental issues and its Chemistry: Chemical entities and factor involve in Global Warming. Acid rain. Ozone layer Depletion. Nuclear accidents. Sustainable development in environment. Practicals: 1.To determine total soluble salt in soil conductometrically 2.To estimate calcium and magnesium in the samples of soil and water.
November	Elementary benefits of natural and synthetic food preservatives, Role of Vitamins and minerals. uses and properties of natural food. Impurities in Food . different synthetic food preservation processes Practicals : 1. To determine the pH in Juice. shampoos and soap solutions. 2.To synthesize BAKELITE and Urea-Formaldehyde Polymers
December	Chemistry in daily life : C-14 isotope role and its measurement in ancient monuments. Interdisciplinary Chemistry in Medicinal, Biological field & Fuel industries, AI in research methodology

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Lesson Plan (2025-26)

Name:- Yogita Sharma

Class: B.Sc. (240/CHEP/CC/101)

Subject:- Chemistry

Semester:- Ist

Month	Topics
August	Atomic Structure & Periodic Properties :Quantum numbers, Aufbau and Pauli exclusion principles, Hund's rules of maximum multiplicity, Periodic classification of elements into s, p, d & f block elements and electronic configuration, screening effect, effective nuclear charge and Slater's rules, discussion and trends of the following properties of representative elements (s & p block): atomic and ionic radii, ionization enthalpy, electron gain enthalpy and electronegativity (Pauling's/ Mulliken's/ Alfred Rachow's scale).
September	Chemical Bonding - Part I Ionic Bonding: Lattice energy, Born-Haber cycle, ionic radii; Metallic Bonding: conductors, semiconductors, and insulators; Weak forces: Van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, instantaneous dipole-induced dipole interactions, hydrogen bonding, Covalent Bonding: Valence bond theory (Heitler-London approach) and its limitation, directional characteristics of covalent bond, type of hybridization and shapes of simple inorganic molecules and ions (BeF_2 , BF_3 , CH_4 , PF_5 , SF_6 , IF_7 , SO_2 , ClO_2 , NO_2 .) Practicals: 1. Determination of surface tension of a liquid using the drop number method. 2. Determination of surface tension of a liquid using the drop weight method. 3. Determination of the viscosity of a liquid using Ostwald's viscometer
October-	Basic Concepts in Organic Chemistry Classification and Nomenclature of organic compounds, Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their comparison & applications, Reaction intermediates: Carbocations, Carbanions, Free radicals, Carbenes, arynes and nitrenes (Types, shape, structure, Mechanistic study and relative stability) Practicals: 1. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
November	Stereochemistry and Conformational Analysis Isomerism: Types of isomerism, Optical isomerism: elements of symmetry, Optical Activity, Molecular chirality/asymmetry, Enantiomers, Diastereoisomers, Meso compounds, Racemic mixture and resolution, Relative and absolute configuration: D/L designation, Geometric isomerism: Cis-Trans and E & Z nomenclature, Conformational isomerism: Conformational analysis of ethane and n-butane: chair, boat, half chair and twist boat conformations of cyclohexane (interconversions and energy level diagram). Practicals: 1. Organic Preparation: a. Bromination of acetanilide/aniline/phenol, b. Nitration of nitrobenzene/toluene
December	Quantum Mechanics: Planck's black body radiation, Photoelectric effect, Bohr's theory, de Broglie postulate, Heisenberg's Uncertainty Principle; Schrödinger's wave equation (including mathematical treatment), postulates of quantum mechanics, normalized and orthogonal wave functions, its complex conjugate (idea of complex numbers) and significance of Ψ^2 ; Operators; Particle in one-dimension box, radial and angular wave functions for hydrogen atom, radial probability distribution; Finding maxima of distribution functions (idea of maxima and minima), energy spectrum of hydrogen atom; Shapes of s, p, d and f orbitals.

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Lesson Plan (2025-26)

Name:- Yogita Sharma
Subject:- Chemistry

Class: B.sc 5th sem
Semester:-5th

Month	Topics
August	Metal-ligand Bonding in Transition Metal Complexes: Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters. Thermodynamic and Kinetic Aspects of Metal Complexes: A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes of Pt(II). Types of magnetic behavior: methods of determining magnetic susceptibility, spin-only formula, L-S coupling, correlation of s and eff values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal 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 $[Ti(H_2O)_6]^{3+}$ complex ion.
September	Quantum Mechanics- Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Compton effect, wave function and its significance of Postulates of quantum mechanics, quantum mechanical operator, commutation relations, Hamiltonian operator, Hermitian operator, average value of square of Hermitian as a positive quantity, Role of operators in quantum mechanics, To show quantum mechanically that position and momentum cannot be predicated simultaneously, Determination of wave function & energy of a particle in one dimensional box, Pictorial representation and its significance. Physical Properties and Molecular Structure- Optical activity, polarization – (Clausius – Mossotti equation), Orientation of dipoles in an electric field, dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules, Magnetic permeability, magnetic susceptibility and its determination, Application of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetics.
October-	Spectroscopy-I Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Born-Oppenheimer approximation, Degrees of freedom, Rotational Spectrum Diatomic molecules. Energy levels of rigid rotator (semi-classical principles), selection rules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotor, isotope effect. Spectroscopy-II Vibrational spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effects of anharmonic motion and isotopic effect on the spectra, idea of vibrational frequencies of different functional groups, Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, Quantum theory of Raman spectra

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November	Carbohydrates-I Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose.
December	Carbohydrates-II An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination. 2. Organometallic Compounds Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.

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