LESSON PLAN (ODD SEMESTER 2025-26)

BHAVANA ARORA
ASSISTANT PROFESSOR IN CHEMISTRY
GOVERNMENT COLLEGE MOHNA

B.Sc. 1st Year (DSC-Chemistry)

Month/Week	First week	Second week	Third week	Fourth week
August	Ionic bond lattice energy, Born-Haber cycle and its applications, Fajan's rules, hydration energy, bond moment,	Dipole moment and percentage ionic character. Resonance and resonance energy: study of some inorganic and organic compounds.	Molecular Orbital Approach: LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combination of atomic orbitals, non- bonding combination of orbitals,	Heteronuclear diatomic molecules Comparison of VB and MO approaches.
September	Oxides – structures of oxides of N, P. Oxyacids – structure and relative acid strengths of oxyacids of nitrogen and phosphorus. Structure of white, yellow and red phosphorus. Oxyacids of sulphur – structures and acidic strength,	H2O2–structure, properties and uses. Basic properties of halogen, interhalogen compounds-types and properties, halogen-acids and oxyacids of chlorine – structure and comparison of acidic strength.	Brönsted–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.	Maxwell's distribution of velocities and energies, collision number, collision frequency and mean free path, deviation of real gases from ideal behaviour,
October	Critical temperature, critical pressure, critical volume and their determination. Compressibility factor. Law of corresponding states.	Electronic displacements and its applications, reaction intermediates and concept of aromaticity. Concept of isomerism,	Revision	Optical activity, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, properties of enantiomers,

		types of isomerism, optical isomerism,		
November	Chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds,	Resolution of enantiomers, inversion, retention and racemization, relative and absolute configuration, sequence rules, R & S system of nomenclature.	Revision	Revision

B.Sc. II Year (DSC-Chemistry)

Month/Week	**First week**	**Second week**	**Third week**	**Fourth week**
August	General characteristics of transition metals, brief discussion of differences between the first, second and third transition series, stability of various oxidation states,	magnetic and spectral properties. Binary compounds and complexes illustrating relative stability of their oxidation states. Chemistry of Ti, V, Cr, Mn, Fe, Co, Mo and W in various oxidation states,	potassium dichromate, potassium permanganate, potassium ferrocyanide, potassium ferricyanide, sodium nitroprusside and sodium cobaltinitrite.	Third law of thermodynamics: Nernst heat theorem, concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions,
September	Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A & G as criteria for spontaneity,	thermodynamic equilibrium and their advantage over entropy change. Variation of G and A with P, V and T. Partial molar quantities.	Arrhenius theory of ionization, Ostwald's Dilution Law. Debye-Huckel–Onsager's equation for strong electrolytes (elementary treatment only), transport number, definition and determination by Hittorf's	Electrolytic conduction, factors affecting electrolytic conduction. Applications of conductivity measurements: determination of dissociation constant (Ka) and degree of dissociation, determination of solubility product

			methods.	of sparingly soluble salts,
October	Conductometric titrations. Definition of pH and pKa, buffer solution, Reversible electrodes	Alkyl halide: Nomenclature and classes of alkyl halides, general methods of preparation, physical properties and chemical reactions,	Revision	Mechanisms (SN1, SN2, E1, E2 and E1cb)
November	Aryl halides: Methods of preparation, Reactions: Aromatic nucleophilic substitution and effect of substituents on reactivity.	Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3), reactivity and relative strength of C-halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.	Revision	Revision

B.Sc. III Year (Physical Chemistry)

Month/Week	First week	Second week	Third week	Fourth week
August	**Quantum Mechanics-I** Black-body radiation	Plank's radiation law, photoelectric effect.	heat capacity of solids, Compton effect,wave function and its significance	Postulates of quantum mechanics ,operators, commutation relations, Hamiltonial and Hermitian operator,Role of operators in quantum mechanics
September	Determination of wave function & energy of particle in one dimensional box, Pictorial representation and its significance	**Physical Properties and Molecular Structure** Optical activity, polarization – (clausius – Mossotti equation). dipole moment, included dipole moment, measurement of dipole moment by different methods.	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** Electromagnetic radiation, statement of Bornoppenheimer approximation, Degrees of freedom.	**Rotational Spectrum** - Energy levels of rigid rotator ,selection rules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotor, isotope effect.	**Revision**	**Spectroscopy-II Vibrational spectrum** Infrared 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
November	anharmonic motion and	**Raman Spectrum**: Concept of	Revision	Revision

	isotopic effect on the spectra., idea of vibrational frequencies of functional groups	polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, selectin rule		