

LESSON PLAN- B.Sc (Life Sc./Physical Sc.) 1st SEMESTER
Session: 2025-26

Name of teacher- **Dr. Anju Siwach**, Assistant Professor

Subject- **DSC-I (Fundamental Chemistry-I)**

CLASS	WEEKS	SYLLABUS
B.Sc. 1 st Sem.	16-7-2025 to 19-7-2025	Chemical Bonding and Molecular Structure Ionic bond lattice energy, Born-Haber cycle and its applications, Fajan's rules,
	21-7-2025 to 26-7-2025	hydration energy, bond moment, dipole moment and percentage ionic character. Resonance and resonance energy: study of some inorganic and organic compounds.
	28-7-2025 to 02-8-2025	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,
	04-8-2025 to 09-8-2025	MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of s-p mixing) and heteronuclear diatomic molecules such as O ²⁻ , O ₂ ²⁻ , N ₂ -, CO, NO ⁺ , CN ⁻ . Comparison of VB and MO approaches.
	11-8-2025 to 16-8-2025	p-Block Elements 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,
	18-8-2025 to 23-8-2025	H ₂ O ₂ –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.
	25-8-2025 to 30-8-2025	Acids and Bases: Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent,
	01-9-2025 to 06-9-2025	differentiating and levelling solvents. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept.
	08-9-2025 to 13-9-2025	Gaseous States Maxwell's distribution of velocities and energies (derivation excluded), calculation of root mean square velocity, average velocity and most probable velocity.
	15-9-2025 to 20-9-2025	Collision diameter, collision number, collision frequency and mean free path, deviation of real gases from ideal behaviour, derivation of Vander Waals Equation of state and
	22-9-2025 to 27-9-2025	its applications in the calculation of Boyle's temperature (compression factor), explanation of behavior of real gases using Vander Waals equation. Critical Phenomenon: Critical temperature, critical pressure, critical volume and their determination. PV isotherms of real gases,

	29-9-2025 to 04-10-2025	continuity of states, isotherms of Vander Waals equation, relationship between critical constants and Vander Waals constants, compressibility factor. Law of corresponding states.
	06-10-2025 to 13-10-2025 23-10-2025 to 25-10-2025 27-10-2025 to 01-11-2025	Basics of Organic Chemistry and Stereochemistry Electronic displacements and its applications, reaction intermediates and concept of aromaticity. Concept of isomerism, types of isomerism, optical isomerism, optical activity, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, properties of enantiomers, 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.
	3-11-2025 to 08-11-2025 10-11-2025 to 18-11-2025 19-11-2025 onwards 21-12-2025 to 31-12-2025	Assignments, Test, Seminars, GD Viva, Revision MDU examination Winter break

LESSON PLAN- B.Sc (Chemistry as Single Major) 1st SEMESTER
Session: 2025-26

Name of teacher- **Dr. Anju Siwach**, Assistant Professor

Subject- **DSC-II (General Chemistry-II)**

CLASS	WEEKS	SYLLABUS
B.Sc. 1 st Semester	16-7-2025 to 19-7-2025	Chemical Bonding: Covalent bonds and their types, valence shell electron pair repulsion theory (VSEPR- H ₂ O, NH ₃ , PCl ₃ , PCl ₅ , SF ₄ , SF ₆ , ClF ₃ , I ₃ ⁻ , BrF ₂ ⁺ , PCl ₆ ⁻ , ICl ₂ ⁻ , ICl ₄ ⁻ , XeOF ₄ , XeO ₃ , ClF ₃ , BrF ₅ , SO ₄ ²⁻ , CO ₂ , NH ₃ etc.).
	21-7-2025 to 26-7-2025 &	Valence bond theory (Heitler-London approach), and its limitations. Bent rule, covalent character in ionic compounds, polarizing power and polarizability. Dipole moment and its applications, Fajan's rules and its applications.
	28-7-2025 to 02-8-2025	Molecular orbital theory and MO diagrams of heteronuclear diatomic molecules (CO, NO ⁺ , CN ⁻ , CO ₃ ²⁻ , NO ₂ ⁻ , HCl, CO ₂ , HF) (idea of s-p mixing and orbital interaction to be given).
	04-8-2025 to 09-8-2025	Gaseous State II: Degree of freedom and principle of equipartition of energy, Maxwell's distribution law of molecular velocities and energies, root mean square velocity, average velocity and most probable velocity and their relationship.
	11-8-2025 to 16-8-2025	Mean free path and its derivation, collision diameter, collision number and collision frequency, viscosity of gases and effect of temperature and pressure on viscosity of gases,
	18-8-2025 to 23-8-2025	relationship between mean free path and coefficient of viscosity, calculation of molecular diameter from coefficient of viscosity.
	25-8-2025 to 30-8-2025	Liquid State: Structure of liquids, properties of liquids – surface tension, refractive index, viscosity, vapour pressure and optical rotation.
	01-9-2025 to 06-9-2025	Alkanes and Alkenes Carbon-Carbon Sigma Bond: Chemistry of alkanes, methods of preparation of alkanes, physical and chemical properties. Free radical substitution: Halogenation – relative reactivity and selectivity.
	08-9-2025 to 13-9-2025	Carbon-Carbon Pi Bond: Structure and isomerism, general methods of preparation, mechanism of E1, E2, E1cB reactions, Saytzeff and Hoffmann eliminations.
	15-9-2025 to 20-9-2025	Reactions of alkenes: Electrophilic additions, Markownikoff rule, syn and anti-addition, addition of H ₂ , X ₂ , oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, hydroxylation and polymerization.

	22-9-2025 to 27-9-2025	Dienes: Classification, methods of preparation, chemical reaction: Diels Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes.
	29-9-2025 to 04-10-2025	Mechanism of allylic and benzylic bromination in propene, 1-butene, toluene, ethyl benzene. Alkynes: General methods of preparation, reactions of alkynes: acidity,
	06-10-2025 to 13-10-2025	electrophilic and nucleophilic additions, hydration to form carbonyls. Aromatic Hydrocarbons: Concept of aromaticity, Huckel rule, aromatic character of arenes,
	23-10-2025 to 25-10-2025	cyclic carbocations and carbanions with suitable examples and heterocyclic compounds with suitable examples.
	27-10-2025 to 01-11-2025	Electrophilic aromatic substitution: halogenation, nitration, sulphonation, Friedel Crafts alkylation/acylation with their mechanism. Directing effects of groups in electrophilic substitution reactions.
	03-11-2025 to 08-11-2025	Assignments, Test, Seminars, GD
	10-11-2025 to 18-11-2025	Viva, Revision
	19-11-2025 onwards	MDU examination
	21-12-2025 to 31-12-2025	Winter break

LESSON PLAN- B.Sc. (Chemistry as Single Major) 3rd SEMESTER
Session: 2025-26

Name of teacher- **Dr. Anju Siwach**, Assistant Professor

Subject- **DSC-V (General Chemistry-V)**

CLASS	WEEKS	SYLLABUS
B.Sc. 3 rd Semester	16-7-2025 to 19-7-2025	Bioinorganic I: Metal ions present in biological system, classification based on action (essential, non- essential, trace, toxic),
	21-7-2025 to 26-7-2025 &	biological role of Na ⁺ , K ⁺ , Ca ²⁺ , Mg ²⁺ , Fe ²⁺ ions, ionophores, active transport of cations across membrane, Na/K-pump.
	28-7-2025 to 02-8-2025	Vitamin B12, carboxypeptidase A and chlorophyll (w.r.t. photosynthesis).
	04-8-2025 to 09-8-2025	Systems of Variable Composition: Partial molar quantities, dependence of thermodynamic parameters on composition,
	11-8-2025 to 16-8-2025	Gibbs Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.
	18-8-2025 to 23-8-2025	Clausius-Clapeyron equation and its applications to solid, liquid, liquid-vapour and solid-vapour equilibria.
	25-8-2025 to 30-8-2025	Alcohols: Classification and nomenclature. Monohydric Alcohols: Nomenclature, methods of preparation by reduction of aldehydes, ketones, carboxylic acids and esters, comparison of acidic behaviour,
	01-9-2025 to 06-9-2025	chemical reactions of alcohols. Industrial manufacture of methanol (from CO and H ₂) and ethanol (flow sheet diagram). Dihydric Alcohols: Nomenclature, methods of preparation,
	08-9-2025 to 13-9-2025	chemical reactions of vicinal glycols, oxidative cleavage (PbOAc ₄ and HIO ₄) and pinacol-pinacolone rearrangement.
	15-9-2025 to 20-9-2025	Trihydric Alcohols: Nomenclature and methods of preparation, chemical reactions of glycerol.

	22-9-2025 to 27-9-2025	Phenols, Ethers and Epoxides Phenols: Preparation and properties, acidity and affecting factors, ring substitution reactions,
	29-9-2025 to 04-10-2025	Reimer–Tiemann and Kolbe’s–Schmidt reactions, Fries and Claisen rearrangements and their mechanism.
	06-10-2025 to 13-10-2025	Ethers: Methods of preparation, physical properties and chemical reactions.
	23-10-2025 to 25-10-2025	Epoxides: Synthesis of epoxides, acid and base- catalyzed ring opening of epoxides,
	27-10-2025 to 01-11-2025	orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.
	03-11-2025 to 08-11-2025	Assignments, Test, Seminars, GD
	10-11-2025 to 18-11-2025	Viva, Revision
	19-11-2025 onwards	MDU examination
	21-12-2025 to 31-12-2025	Winter break

LESSON PLAN- B.Sc. III (Hons.) Vth Semester
Session: 2025-26

Name of teacher- **Dr. Anju Siwach**, Assistant Professor

Subject- **Inorganic Chemistry (Theory) - I / CH (H) - 501**

CLASS	WEEKS	SYLLABUS
B.Sc. 5 th Semester	16-7-2025 to 19-7-2025	Metal - ligand Bonding in Transition Metal Complexes: Limitation of valence bond theory, an elementary idea of crystal-field theory,
	21-7-2025 to 26-7-2025 &	crystal field splitting in octahedral,
	28-7-2025 to 02-8-2025	crystal field splitting tetrahedral and square planar complexes,
	04-8-2025 to 09-8-2025	factors affecting the crystal-field parameters.
	11-8-2025 to 16-8-2025	Magnetic Properties of Transition Metal complexes: Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula.
	18-8-2025 to 23-8-2025	L-S coupling, correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments,
	25-8-2025 to 30-8-2025	application of magnetic moment data for 3d-metal complexes.
	01-9-2025 to 06-9-2025	Thermodynamic and Kinetic Aspects of Metal Complexes: A brief outline of thermodynamic stability of metal complexes
	08-9-2025 to 13-9-2025	factors affecting the stability,
	15-9-2025 to 20-9-2025	substitution reactions of square planar complexes.

	22-9-2025 to 27-9-2025	Electron Spectra of Transition Metal Complexes: Types of electronic transitions, selection rules of d-d transitions, spectroscopic ground states,
	29-9-2025 to 04-10-2025	spectrochemical series, Orgel - energy level diagram for d1 and d9 states, discussion of the electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ complex ion.
	06-10-2025 to 13-10-2025	Hard and Soft Acids and Bases (HSAB) Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness.
	23-10-2025 to 25-10-2025	Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.
	27-10-2025 to 01-11-2025	Silicones, Phosphazenes and S - N compounds: Synthesis, properties nature of bonding, structures and applications
	03-11-2025 to 08-11-2025	Assignments, Test, Seminars, GD
	10-11-2025 to 18-11-2025	Viva, Revision
	19-11-2025 onwards	MDU examination
	21-12-2025 to 31-12-2025	Winter break

LESSON PLAN- B.Sc. III (Hons.) Vth Semester
Session: 2025-26

Name of teacher- **Dr. Anju Siwach**, Assistant Professor

Subject- **Inorganic Chemistry (Theory) - II / CH (H) - 502**

CLASS	WEEKS	SYLLABUS
B.Sc. 5 th Semester	16-7-2025 to 19-7-2025	Organometallic Chemistry-I Definition, Nature of Metal Carbon bond,
	21-7-2025 to 26-7-2025	classification of organometallic compounds by bond types viz. i) covalent ii) Ionic iii) Electron deficient iv) cluster compounds v) bond compounds including sandwich derivatives.
	28-7-2025 to 02-8-2025	Structure and bonding in, metal-ethylenic, metal-acetylenic complexes,
	04-8-2025 to 09-8-2025	Organometallic Chemistry-II Structure and bonding in Metal carbonyls, cyclopentadienyl derivative,
	11-8-2025 to 16-8-2025	Applications of organometallic compounds as homogeneous catalysts in hydrogenation,
	18-8-2025 to 23-8-2025	Applications of organometallic compounds as homogeneous catalysts in hydroformylation, polymerization,
	25-8-2025 to 30-8-2025	Applications of organometallic compounds as homogeneous catalysts in oligomerization and metathesis reactions of alkenes and alkynes
	01-9-2025 to 06-9-2025	(Ziegler - Natta polymerization of ethylene and propylene.)
	08-9-2025 to 13-9-2025	Bio- Inorganic Chemistry: Essential and Trace elements in biological processes,
	15-9-2025 to 20-9-2025	bioinorganic chemistry of haemoglobin and myoglobin,
	22-9-2025 to 27-9-2025	bioinorganic chemistry of vitamin B12, carboxypeptidase A and chlorophyll,
	29-9-2025 to 04-10-2025	biological role of alkali and alkaline earth metal ions with nitrogen fixation (special reference to Ca ²⁺ .)

	06-10-2025 to 13-10-2025 23-10-2025 to 25-10-2025 27-10-2025 to 01-11-2025	Medicinal Chemistry: Medicinal aspects of some metal complexes - platinum metal complexes as anticancer agents and their probable mechanism, anticancer activity of Cu, Co and Au complexes. Antibacterial and antiviral activity of metal complexes. Corrosion and Passivity: Theories of corrosion, prevention of corrosion of metals, passivity.
	03-11-2025 to 08-11-2025 10-11-2025 to 18-11-2025 19-11-2025 onwards 21-12-2025 to 31-12-2025	Assignments, Test, Seminars, GD Viva, Revision MDU examination Winter break

LESSON PLAN- B.Sc. (Pass Course) Vth Semester
Session: 2025-26

Name of teacher- **Dr. Anju Siwach**, Assistant Professor

Subject- **Inorganic Chemistry (Theory)**

CLASS	WEEKS	SYLLABUS
B.Sc. 5 th Semester	16-7-2025 to 19-7-2025	Metal-ligand Bonding in Transition Metal Complexes Limitations of valence bond theory,
	21-7-2025 to 26-7-2025	an elementary idea of crystal-field theory, crystal field splitting in octahedral complexes,
	28-7-2025 to 02-8-2025	crystal field splitting in tetrahedral and square planar complexes,
	04-8-2025 to 09-8-2025	factors affecting the crystal-field parameters.
	11-8-2025 to 16-8-2025	Thermodynamic and Kinetic Aspects of Metal Complex A brief outline of thermodynamic stability of metal complexes
	18-8-2025 to 23-8-2025	factors affecting the stability,
	25-8-2025 to 30-8-2025	substitution reactions of square planar complexes of Pt(II).
	01-9-2025 to 06-9-2025	Magnetic Properties of Transition Metal Complex Types of magnetic behavior, methods of determining magnetic susceptibility,
	08-9-2025 to 13-9-2025	spin-only formula. L-S coupling, correlation of μ_s and μ_{eff} values,
	15-9-2025 to 20-9-2025	orbital contribution to magnetic moments,
	22-9-2025 to 27-9-2025	application of magnetic moment data for 3d metal complexes

	29-9-2025 to 04-10-2025 06-10-2025 to 13-10-2025 23-10-2025 to 25-10-2025 27-10-2025 to 01-11-2025	Electron Spectra of Transition 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(H₂O)₆]³⁺ complex ion.
	03-11-2025 to 08-11-2025 10-11-2025 to 18-11-2025 19-11-2025 onwards 21-12-2025 to 31-12-2025	Assignments, Test, Seminars, GD Viva, Revision MDU examination Winter break