Department of Chemistry
BRSAC Dujana (Jhajjar)

LESSON PLANS

LESSON PLAN- B.Sc1st SEMESTER Session: 2024-25 Name of teacher- ~~Dr. Rajni~~, Dr Sanjay Kumar Class: B.Sc.1st Sem(SEC) Subject-Role of Chemistry in Society	
22nd–27thJuly	**Analysis of soil: Composition of soil**
28thJuly	**SUNDAY**
29th-03rdAugust	Concept of pH and pH measurement of soil
04thAugust	**SUNDAY**
5th-10thAugust	Complexometric titrations, Chelation, Chelating agents, use of indicators
11thAugust	**SUNDAY**
12th-17thAugust	Estimation of Calcium and Magnesium ions in soil.
18thAugust	**SUNDAY**
19th-24thAugust	Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods.
25thAugust	**SUNDAY**
26th–31stAugust	water purification methods. Determination dissolved oxygen of a water sample.
1st September	**SUNDAY**
2nd -7th September	A general study including preparation and uses of the Hair dye, soap, shampoo.
08th September	**SUNDAY**
9th-14th September	Preparation and uses of the suntan lotions, face powder, lipsticks, talcum powder, nail enamel.
15th September	**SUNDAY**
16th-21st September	General introduction to pesticides (natural and synthetic), benefits and adverse effects
22nd September	**SUNDAY**
23th-28th September	Changing concepts of pesticides, brief introduction of structure activity relationship
29th September	**SUNDAY**

30th Sep -05th October	Synthesis and technical manufacture and uses of representative pesticides in the Organochlorines (Gammexene,); Organophosphates (Malathion).
06th October	**SUNDAY**
07th-12th October	Basic principle of pH metric, potentiometric and conductometric titrations
13th October	**SUNDAY**
14th-19th October	Applications of conductivity measurements: determination of degree of dissociation
20th October	**SUNDAY**
21st–26th October	Determination of Ka of acids and base, Buffer solution, Buffer action,
27th October	**SUNDAY**
4th –9th November	Henderson – Hazel equation, Buffer mechanism of buffer action.
10th November	**SUNDAY**
11th-16th November	Revision and test
17th November	**SUNDAY**
18th November onwards till Exams.	Test discussion

Session: 2024-25

Name of teacher- Dr. Rajni, Dr Sanjay Kumar

Class- B.Sc. (Physical Sciences)

Subject- DSC Paper – I Fundamental Chemistry

WEEKS	SYLLABUS
22-7-2024 to 27-7-2024	**Unit–I** **Chemical Bonding and Molecular Structure** Ionic bond, lattice energy, Born-Haber cycle and its applications, Fajan's rules, hydration energy, bond moment, dipole moment and percentage ionic character.
29-7-2024 to 3-8-2024	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,
5-8-2024 to 10-8-2024	MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of s-p mixing) and heteronuclear diatomic molecules such as O2-, O22-, N2-, CO, NO+, CN-. Comparison of VB and MO approaches
12-8-2024 to 17-8-2024	**Unit–II** **p-Block Elements** Oxides – structures of oxides of N, P. Oxyacids – structure and relative acid strengths of oxyacids of nitrogen and phosphorus
20-8-2024 t 24-8-2024	. 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.
27-8-2024 to 31-8-2024	**Acids and Bases:** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents
2-9-2024 to 7-9-2024	. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept.
9-9-2024 to 14-9-2024	**Unit–III** **Gaseous States** Maxwell's distribution of velocities and energies (derivation excluded), calculation of root mean square velocity, average velocity and most probable velocity.
16-9-2024 to 21-9-2024	Collision diameter, collision number, collision frequency and mean free path, deviation of real gases from ideal behaviour, derivation of

	Van der Waals Equation of state and its applications in the calculation of Boyle's temperature (compression factor),
23-9-2024 to 28-9-2024	explanation of behavior of real gases using Van der Waals equation.
30-9-2024 to 5-10-2024	**Critical Phenomenon:** Critical temperature, critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, isotherms of Van der Waals equation, relationship between critical constants and Van der Waals constants, compressibility factor. Law of corresponding
7-10-2024 to 12-10-2024	**Unit–IV** **Basics of Organic Chemistry and Stereochemistry** Electronic displacements and its applications, reaction intermediates and concept of aromaticity.
14-10-2024 to 19-10-2024	Concept of isomerism, types of isomerism, optical isomerism, optical activity, elements of symmetry, molecular chirality, enantiomers, stereogenic centre,
21-10-2024 to 26-10-2024	properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers
4-11-2024 to 9-11-2024	, meso compounds, resolution of enantiomers, inversion, retention and racemization, relative and absolute configuration, sequence rules, R & S system of nomenclature.
11-11-2024 to 20-11-2024	Unit Test
23-11-2024 to 20-12-2024	**MDU examination**
21-12-2024 to 31-12-2024	**Winter break**

LESSON PLAN- B.Sc 3rd SEMESTER **Session: 2024-25**

Name of teacher- Dr. Rajni, Dr Sanjay Kumar

Class- B.Sc. Pass Course (Non-medical)
Subject- Inorganic Chemistry

WEEKS	SYLLABUS
22-7-2024 to 27-7-2024	**Unit 1: Chemistry of Elements of Ist transition series:** Definition of transition elements.
29-7-2024 to 3-8-2024	Position of lanthanides in the periodic table
5-8-2024 to 10-8-2024	General characteristics &properites of Ist transition elements.
12-8-2024 to 17-8-2024	Structures & properties of some compounds of transition elements – TiO2, VOCl2, FeCl3.
20-8-2024 t 24-8-2024	Structures & properties of some compounds of transition elements – CuCl2 and Ni (CO)4
27-8-2024 to 31-8-2024	**Unit 2: Chemistry of Elements of IInd&IIIrd transition series:**General characteristics and properties of the IInd and IIIrd trans ition elements
2-9-2024 to 7-9-2024	Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, oxidation state.
9-9-2024 to 14-9-2024	Comparison of properties of 3d elements with 4d & 5d elements with reference only to magnetic and Spectral properties and stereochemistry. **Test and Revision.**
16-9-2024 to 21-9-2024	**Unit 3: Coordination Compounds:** Werner's coordination theory,
23-9-2024 to 28-9-2024	effective atomic number concept, chelates.
30-9-2024 to 5-10-2024	nomenclature of coordination compounds, isomerism in coordination compounds.

7-10-2024 to 12-10-2024	valence bond theory of transition metal complexes
14-10-2024 to 19-10-2024	**Unit 4: Non-aqueous Solvents**: Physical properties of a solvent,
21-10-2024 to 26-10-2024	types of solvents and their general characteristics
4-11-2024 to 9-11-2024	reactions in non-aqueous solvents with reference to liquid NH3 and liquid SO2
11-11-2024 to 20-11-2024	**Test, Revision, Assignments, Viva.**
23-11-2024 to 20-12-2024	**MDU examination**
21-12-2024 to 31-12-2024	**Winter break**

LESSON PLAN- B.Sc 3rd SEMESTER **Session: 2024-25**

Name of teacher- Dr. Rajni, Dr Sanjay Kumar

Class- B.Sc. Pass Course (Non-medical)
Subject- Physical Chemistry

WEEKS	SYLLABUS
22-7-2024 to 27-7-2024	**Unit 1: Thermodynamics-I** Definition of thermodynamic terms: system,surrounding etc.
29-7-2024 to 3-8-2024	Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.
5-8-2024 to 10-8-2024	Zeroth Law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship
12-8-2024 to 17-8-2024	Joule's law – Joule – Thomson coefficient for ideal gass and real gas: and inversion temperature. **Test and Revision.**
20-8-2024 t 24-8-2024	**Unit 2: Thermodynamics-II** Calculation of w.q. dU&dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.
27-8-2024 to 31-8-2024	Temperature dependence of enthalpy, Kirchoffs equation
2-9-2024 to 7-9-2024	Bond energies and applications o f bond energies.
9-9-2024 to 14-9-2024	**Unit 3: Chemical Equilibrium**Equilibrium constant and free energy, concept of chemical potential,
16-9-2024 to 21-9-2024	Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van't Hoff reaction isochore, Van't Hoff reaction isotherm.
23-9-2024 to 28-9-2024	Le-Chatetier's principle and its applications Clapeyron equation and Clausius – Clapeyron equation its applications.

30-9-2024 to 5-10-2024	**Unit 4: Distribution Law** Nernst distribution law – its thermodynamic derivation,
7-10-2024 to 12-10-2024	Modification of distribution law when solute undergoes dissociation, association and chemical combination.
14-10-2024 to 19-10-2024	Applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride.
21-10-2024 to 26-10-2024	) Determination of equilibrium constant of potassium tri-iodide complex and process of extraction.
4-11-2024 to 9-11-2024	**Test, Revision.**
11-11-2024 to 20-11-2024	**Assignments, Viva.**
23-11-2024 to 20-12-2024	**MDU examination**
21-12-2024 to 31-12-2024	**Winter break**

LESSON PLAN- B.Sc 3rdSEMESTER **Session: 2024-25**

Name of teacher- Dr. Rajni, Dr Sanjay Kumar

Subject- organic Chemistry

WEEKS	SYLLABUS
22-7-2024 to 27-7-2024	**Unit 1: Alcohols** Monohydric alcohols nomenclature, methods of formation by reduction of aldehydes, ketone.
29-7-2024 to 3-8-2024	Methods of formation by reduction of carboxylic acids and esters. Hydrogen bonding. Acidic nature.
5-8-2024 to 10-8-2024	Reactions of alcohols. Dihydric alcohols — nomenclature, methods of formation, chemical reactions of vicinal glycols
12-8-2024 to 17-8-2024	**Unit 2 Epoxides** Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening
20-8-2024 t 24-8-2024	Reactions of Grignard and organolithium reagents with epoxides
27-8-2024 to 31-8-2024	**Unit 3: Phenols** Nomenclature, structure and bonding. Preparation of phenols, physical propertiesand acidic character.
2-9-2024 to 7-9-2024	Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols — electrophilic aromatic substitution,
9-9-2024 to 14-9-2024	Mechanisms of Fries rearrangement,Claisen rearrangement, Reimer-Tiemann reaction, Kolbe's reaction. Schotten and Baumann reactions
16-9-2024 to 21-9-2024	**Unit 4: Ultraviole t (UV) absorption spectroscopy** Absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra Types of electronic transitions, effect of conjugation. Concept of

	chromophore and auxochrome
23-9-2024 to 28-9-2024	.Bathochromic, hypsochromic, hyperchromic andhypochromic shifts. UV spectra of conjugated enes and enones Woodward- Fieser rules, calculation of max of simple conjugated dienes and , -unsaturated ketones. Applications o f UV Spectroscopy in structure elucidation of simple organic compounds.
30-9-2024 to 5-10-2024	**Unit 5: Carboxylic Acids & Acid Derivatives** Nomenclatu re of Carboxylic acids, structure and bonding, physical properties, acidity of carboxylic acids,
7-10-2024 to 12-10-2024	Effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids.
14-10-2024 to 19-10-2024	Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation. Structure , nomenclature and preparation of acid chlorides,
21-10-2024 to 26-10-2024	Structures, nomenclature and preparation of esters, amides and acid anhydrides. Relative stability of acyl derivatives. Phys ical properties, interconvers ion of acid derivatives by nucleophilic acyl substitution.
4-11-2024 to 9-11-2024	Mechanisms of esterification and hydrolysis (acidic and basic)
11-11-2024 to 20-11-2024	Assignments, Viva, Test, Revision
23-11-2024 to 20-12-2024	MDU examination
21-12-2024 to 31-12-2024	Winter break

LESSON PLAN- B.Sc5th SEMESTER **Session: 2024-25**

Name of teacher- Dr. Rajni, Dr Sanjay Kumar

Subject- Inorganic Chemistry

WEEKS	SYLLABUS
22-7-2024 to 27-7-2024	Metal-ligand Bonding in Transition Metal Complexes Limitations of valence bond theory,
29-7-2024 to 3-8-2024	an elementary idea of crystal-field theory, crystal field split ting in octahedral
5-8-2024 to 10-8-2024	crystal field split tetrahedral and square planar complexes,
12-8-2024 to 17-8-2024	factors affecting the crystal-field parameters
20-8-2024 t 24-8-2024	Thermodynamic and Kinetic Aspects of Metal Complexe
27-8-2024 to 31-8-2024	A brief outline of thermodynamic stability of metal complexes and factors affecting the stability,
2-9-2024 to 7-9-2024	substitution reactions of square planar complexes of Pt(II)
9-9-2024 to 14-9-2024	Magnetic Properties of Transition Metal Complexe Types of magnetic behaviour
16-9-2024 to 21-9-2024	methods of determining magnetic susceptibility, spin-only formula.
23-9-2024 to 28-9-2024	L-S coupling, correlation of s and eff values, orbital contribution to magnetic moments, application of magnetic moment data for 3dmetal complexes.
30-9-2024 to 5-10-2024	Electron Spectra of Transition Metal Complexes Types of electronic transitions,
7-10-2024 to 12-10-2024	selection rules for d-d transitions, spectroscopic ground states, spectrochemical series.
14-10-2024 to 19-10-2024	Orgel-energy level diagram for d1 and d9 states,

21-10-2024 to 26-10-2024	discussion of the electronic spectrum of [Ti(H2O)6]3+ complex ion
4-11-2024 to 9-11-2024	Revision of Electron Spectra , Doubts
11-11-2024 to 20-11-2024	Assignments, Viva, Test, Revision
23-11-2024 to 20-12-2024	MDU examination
21-12-2024 to 31-12-2024	Winter break

LESSON PLAN- B.Sc 5th SEMESTER **Session: 2024-25**

Name of teacher- Dr. Rajni, Dr Sanjay Kumar

Subject- Physical Chemistry

WEEKS	SYLLABUS
22-7-2024 to 27-7-2024	Quantum Mechanic s-Black-body radiation, Plank's radiation law, photoelectric effect
29-7-2024 to 3-8-2024	heat capacity of solids, Compton effect, wave function and its significance of Postulates of quantum mechanics ,.
5-8-2024 to 10-8-2024	quantum mechanical operator, commutation relations, Hamiltonian operator, Hermitian operator, average value of square of Hermitian as a positive quantity,
12-8-2024 to 17-8-2024	Role of operators in quantum mechanics, To show quantum mechanically that position and momentum cannot be predicated simultaneously,
20-8-2024 t 24-8-2024	Determination of wave function & energy of a particle in one dimensional box, Pictorial representation and its significance
27-8-2024 to 31-8-2024	Physical Properties and Molecular Structure Optical activity, polarization – (clausius – Mossotti equation). Orientation of dipoles in an electric field, dipole moment,
2-9-2024 to 7-9-2024	, measurement of dipole moment-temperature method and refractivity method, dipole moment and
9-9-2024 to 14-9-2024	structure of molecules, Magnetic permeability, magnetic susceptibility and its determination. Application of magnetic susceptibility, magnetic properties – Para magnetism, diamagnetism and ferromagnetic.
16-9-2024 to 21-9-2024	Spectroscopy-I Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Born Oppenheimer approximation, Degrees of freedom..
23-9-2024 to 28-9-2024	Rotational Spectrum Diatomic molecules. Energy levels of rigid rotator (semi-classical principles), selection rules,

30-9-2024 to 5-10-2024	spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotor, isotope effect..
7-10-2024 to 12-10-2024	Vibrational spectrum Infrared spectrum: Energy levels of simple harmonic oscillator,
14-10-2024 to 19-10-2024	selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies,
21-10-2024 to 26-10-2024	effects of anharmonic motion and isotopic effect on the spectra., idea of vibrational frequencies of different functional groups.
4-11-2024 to 9-11-2024	Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selectin rules, Quantum theory of Raman spectra
11-11-2024 to 20-11-2024	Assignments, Viva, Test, Revision
23-11-2024 to 20-12-2024	MDU examination
21-12-2024 to 31-12-2024	Winter break

LESSON PLAN- B.Sc 5th SEMESTER **Session: 2024-25**

Name of teacher- Dr. Rajni, Dr Sanjay Kumar

Subject- Organic Chemistry

WEEKS	SYLLABUS
22-7-2024 to 27-7-2024	NMR Spectroscopy-I Principle of nuclear magnetic resonance, the PMR spectrum,number of signals, peak areas,.
29-7-2024 to 3-8-2024	equivalent and nonequivalent protons positions of signals and chemical shift,shielding and deshielding of protons,
5-8-2024 to 10-8-2024	proton counting,splitting of signals and coupling constants, magnetic equivalence of protons
12-8-2024 to 17-8-2024	NMR Spectroscopy-II Discuss ion of PMR spectra of the molecules: ethyl bromide, npropyl bromide, isopropyl bromide,
20-8-2024 t 24-8-2024	1,1-dibromoethane, 1,1,2-tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene,
27-8-2024 to 31-8-2024	benzaldehyde and acetophenone. Simple problems on PMR spectroscopy for structure determination of organic compounds
2-9-2024 to 7-9-2024	Carbohydrates-I Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.
9-9-2024 to 14-9-2024	Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose in to mannose. Formation of glycosides,.
16-9-2024 to 21-9-2024	ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose.
23-9-2024 to 28-9-2024	Mechanism ofmutarotation. Structures of ribose and deoxyribose
30-9-2024 to 5-10-2024	1. Carbohydrates-II An introduction to disaccharides (maltose, sucrose and lactose) and.

7-10-2024 to 12-10-2024	polysaccharides (starch and cellulose) without involving structure determination
14-10-2024 to 19-10-2024	2. Organometallic Compounds Organmagnesium compounds: the Grignard reagents-formation
21-10-2024 to 26-10-2024	, structure and chemical reactions. Organozinc compounds: formation and
4-11-2024 to 9-11-2024	chemical reactions. Organolithium compounds: formation and chemical reactions.
11-11-2024 to 20-11-2024	Assignments, Viva, Test, Revision
23-11-2024 to 20-12-2024	MDU examination
21-12-2024 to 31-12-2024	Winter break