Lesson Plan 2025-26

Teacher Name-: Dr .Laxmi

Name of the Class -: B. Sc 1st Year

Name of the Subject -: DSC (Th+P)

Month	Topic
July to August	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. 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, 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.
August to September	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, 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. 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. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept.
September to October	Gaseous States: Maxwell's distribution of velocities and energies (derivation excluded), calculation of root mean square velocity, average velocity and most probable velocity. 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), explanation of behavior of real gases using Van der Waals equation. 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 states.
October to November	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.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.Sc with major in Physics + B. A. 1st Year, Sem-I

Name of the Subject -: Minor (Th+P)

Month	Topic
July to August	Atomic Structure: Atomic models, Rutherford's model and its limitations, Bohr's model and its applications, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of atoms, stability of half-filled and completely filled orbitals.
August to September	Periodic Table and Atomic Properties: Brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas radii, ionization enthalpy, electron gain enthalpy, electronegativity, valency. Nomenclature of elements with atomic number greater than 100.
September to October	Mole Concept: Atomic mass, mole concept and molar mass, Avogadro's number and its significance, percentage composition, empirical and molecular formula, chemical reactions, ways of expressing concentration of solutions (molarity, normality, molality, mole percentage, strength), stoichiometric calculations involving reactants and products.
October to November	Fundamentals of Organic Chemistry: Electronic displacements: Inductive effect, electromeric effect, resonance, hyperconjugation. Cleavage of bonds: homolysis and heterolysis. Reaction intermediates: carbocations, carbanions, free radicals, and carbenes. Electrophiles and nucleophiles. Aromaticity: benzenoids and Huckel’s rule.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.Sc Physical Science, 1st Year, Sem-I

Name of the Subject -: SEC (Th+P)

Month	Topic
July to August	Analysis of Soil and Water: Composition of soil, concept of pH and pH measurement of soil, complexometric titrations, chelation, chelating agents, use of indicators, estimation of calcium and magnesium ions in soil. Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods, determination of dissolved oxygen of a water sample.
August to September	Chemistry in Cosmetics: A general study including preparation and uses of the following: Hair dye, soap, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel.
September to October	Pesticides: General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, brief introduction of structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: organochlorines (gammexene), organophosphates (malathion).
October to November	Experimental Techniques: Basic principle of pH metric, potentiometric and conductometric titrations, applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids and base, buffer solution, buffer action, Henderson–Hazel equation, buffer mechanism of buffer action.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.A. + BBA 1st Year, Sem I

Name of the Subject -: MDC (Th+P)

Month	Topic
July to August	Basic Concepts of Chemistry: Introduction, Dalton atomic theory, concept of atom, element and molecule, matter and its classification, chemical reactions, empirical and molecular formula, atomic mass, molecular mass, mole concept, ways of expressing concentration of solutions (molarity, normality, molality, mole fraction, strength).
August to September	Atomic Structure: Thomson's model, Rutherford's model, Bohr's model, electron, proton, neutron and their characteristics, atomic number, atomic mass, isotopes, isobars and isotones, dual nature of matter and light, de Broglie's relationship, Heisenberg Uncertainty principle, concept of orbit and orbital, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in the orbitals (Aufbau principle, Pauli exclusion principle and Hund's rule), electronic configuration of atoms, extra stability of half-filled and completely filled orbitals.
September to October	States of Matter: Introduction to the three states of matter and intermolecular interactions. Gaseous state: Boyle's law, Charles' law, Gay Lussac's law and Avogadro's Law with practical implications. Elementary idea of kinetic energy, molecular speeds, ideal gas equation and deviation from ideal behavior. Liquid state: Melting and boiling points, vapor pressure, viscosity and surface tension. Solid state: General characteristics of solid state, crystalline and amorphous solids, classification of crystalline solids.
October to November	Chemistry in Everyday Life: Drugs and their classification with suitable examples, food adulterants and preservatives, artificial sweetening agents, antioxidants, soaps and detergents and their cleansing action.

Lesson Plan 2025-26

Teacher Name-: Dr .Laxmi

Name of the Class -: B. Sc 2nd Year, Sem III

Name of the Subject -: DSC (Th+P)

Month	Topic
July to August	Chemistry of Transition series elements 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, some important compounds as laboratory reagents: potassium dichromate, potassium permanganate, potassium ferrocyanide, potassium ferricyanide, sodium nitroprusside and sodium cobaltinitrite.
August to September	Thermodynamics-II: Third law of thermodynamics: Nernst heat theorem, concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions, 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.
September to October	Electrochemistry: 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 methods. Electrolytic conduction, factors affecting electrolytic conduction. Applications of conductivity measurements: determination of dissociation constant (Ka) and degree of dissociation, determination of solubility product of sparingly soluble salts, conductometric titrations. Definition of pH and pKa, buffer solution, buffer action, Henderson – Hasselbalch equation, buffer mechanism of buffer action. Reversible electrodes: Metal- metal ion gas electrode, metal – metal insoluble salt- anion electrode and redox electrode.
October to November	Alkyl and aryl halides Alkyl halide: Nomenclature and classes of alkyl halides, general methods of preparation, physical properties and chemical reactions, mechanisms (SN1, SN2, E1, E2 and E1cb) and stereochemistry of nucleophilic substitution reactions of alkyl halides with energy profile diagrams, elimination vs substitution reactions. 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.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.Sc Physical Science, 2nd Year, Sem-III

Name of the Subject -: SEC (Th+P)

Month	Topic
July to August	Basic Concepts: Components of cells and batteries, classification of cells and batteries, operation of a cell, theoretical cell voltage, capacity, energy, specific energy and energy density of practical batteries.
August to September	Battery Design and Factors Affecting Battery Performance: General introduction, designing to eliminate potential safety problems, battery safeguards when using discrete batteries, battery construction, design of rechargeable batteries, factors affecting battery performance.
September to October	Primary Batteries: General characteristics and applications of primary batteries, types and characteristics of primary batteries, comparison of the performance characteristics of primary battery systems, recharging primary batteries. A) Zinc-Carbon Batteries (Leclanche´ and Zinc Chloride Cell Systems): General characteristics, cell chemistry, types of cells and batteries, construction, cell components. B) Magnesium and Aluminum Batteries: General characteristics, cell chemistry, construction of Mg/MnO2 batteries, performance characteristics of Mg/MnO2 batteries, sizes and types of Mg/MnO2 batteries, other types of magnesium primary batteries.
October to November	Secondary Batteries: General characteristics and applications of secondary batteries, types and characteristics of secondary batteries, comparison of performance characteristics for secondary battery systems and introduction, chemistry, construction, performance characteristics, charging characteristics of following batteries: Lead batteries, Lithium ion batteries, Iron electrode batteries, Nickel-Cadmium, Nickel-Metal hydride, Nickel Zinc batteries.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.A. + BBA 2nd Year, Sem III

Name of the Subject -: MDC (Th+P)

Month	Topic
July to August	Coordination Compounds Coordination compounds, ligands, coordination number, oxidation states, coordination entity, IUPAC nomenclature of coordination compounds, isomerism in coordination compounds with coordination numbers 4 and 6. Chelates and chelate effect, Valence bond theory and its application to complexes of coordination numbers 4 and 6. Examples of inner and outer orbital complexes, limitations of VBT. Basic idea of Crystal field theory.
August to September	Magnetic Properties of Transition Metal Complexes: Types of magnetic behavior, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of μs and μeff values, orbital contribution to magnetic moments, applications of magnetic moment data for 3d metal complexes. 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).
September to October	Kinetics and Chemical Equilibrium: Integrated rate expression for first, second and third order reaction and their half-life period. Methods of determination of order of reaction. Effect of temperature on the rate of reaction – Arrhenius equation. Theories of reaction rate–Simple collision theory for unimolecular and bimolecular collision. Transition state theory of bimolecular reactions. Equilibrium constant and free energy, concept of chemical potential, thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant, Van't Hoff reaction isochores, Van't Hoff reaction isotherm. Le-Chatelier's principle and its applications, Clapeyron equation and Clausius – Clapeyron equation & its applications.
October to November	Alcohols, Phenols and Ethers Alcohols: General methods of preparation using Grignard reagent, ester hydrolysis, reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: with sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acid. dichromate, con. HNO_3). Oppeneauer oxidation. Diols: Oxidation of diols. Pinacol Pinacolone rearrangement. Phenols: Methods of preparation, physical properties and acidic character. Reactions: electrophilic substitution (nitration, halogenation and sulphonation). Reimer-Tiemann reaction, Gattermann-Koch reaction, Houben-Hoesch condensation, Schotten-Baumann reaction. Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.Sc (Pass) 3rd Year, Sem III

Name of the Subject -: Inorganic Chemistry

Month	Topic
July to August	Metal-ligand Bonding in Transition Metal Complexes: Limitations of valence bond theory, an elementary idea of cr ystal-f ield theory, crystal field split ting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-f ield parameters.
August to September	Thermodynamic and Kinetic Aspects of Metal Complexe: 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).
September to October	Magnetic Properties of Transition Metal Complexe: Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of sand effvalues, orbital contribution to magnetic moments, application of magnetic moment data for 3dmetal complexes.
October to November	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 d1and d9 states, discussion of the electronic spectrum of [Ti(H2O)6]3+complex ion.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.Sc (Pass) 3rd Year, Sem III

Name of the Subject -: Physical Chemistry

Month	Topic
July to August	Quantum Mechanic s-I Black-body radiation, Plank'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, Hamiltonial 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 partic le in one dimensional box, Pictorial representation and its significance.
August to September	Physical Properties and Molecular Structure: Optica l activity, polarization– (clausius– Mossotti equation). Orientation of dipoles in an electric field, dipole moment, included dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules, Magnetic permeability, magnetic susceptibility and its determination. Applica tion of magnetic susceptibility, magnetic properties– paramagnetism, diamagnetism and ferromagnetics.
September to October	Spectroscopy-I Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Bornoppenheimer 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.
October to November	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, effects of anharmonic motion and isotopic effect on the spectra., idea of vibrational frequencies of different functional groups. Raman Spectrum: Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, selectin rules, Quantum theory of Raman spectra.

Lesson Plan 2025-26

Teacher Name-: Dr. Laxmi

Name of the Class -: B.Sc (Pass) 3rd Year, Sem III

Name of the Subject -: Physical Chemistry

Month	Topic
July to August	NMR Spectroscopy-I 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.
August to September	NMR Spectroscopy-II Discuss ion of PMR spectra of the molecules: ethyl bromide, npropyl bromide, isopropyl bromide, 1,1-dibromoethane, 1,1,2-tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone..Simple problems on PMR spectroscopy for structure determination of organic compounds
September to October	Carbohydrates-I 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 to November	1. Carbohydrates-II An introduc tion 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.