

LESSON PLAN

Session: 2025-26

Name of teacher- Dr. Urmila

Class Course: B.Sc (Hons.)1st SEMESTER

Code: - 24CHES401DS01

Subject- DSC PAPER I General Chemistry-I

Month	Syllabus
July	Unit – I Atomic Structure and Periodicity of Elements: Bohr's atomic model and its application, quantum numbers, their application and rules of electronic configuration, effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. Periodic trends in atomic radii, ionic radii and its calculation, covalent radii, electronegativity, electron gain enthalpy, ionization enthalpy and factors affecting ionization energy. Pauling, Mullikan and Allred Rachow scales.
August	Unit – II Ionic Solids: Ionic bond and its characteristics and factors affecting, types of Bravais lattice, voids, packing in solids, determination of radius ratio of all voids, radius ratio rule and its limitations. Packing of ions in crystals, calculation of density and crystal structures of ionic solids (NaCl, CsCl, ZnS, CaF ₂ , Na ₂ O), defect structures in crystal. Born-Landé equation with derivation, expression for lattice energy, Madelung constant, Born-Haber cycle and its application with examples, solvation energy. Semiconductors, types of semiconductors, valence bond and band theories (alloys excluded).
September	Unit – III Gaseous State-I: Elementary treatment of gas laws, kinetic gas equation and its derivation, deviations from ideal gas behaviour, compressibility factor (Z) and its variation with pressure and temperature for different gases, Van der Waals equation of state, its derivation and application in explaining real gas behavior, mention other equations of state (Berthelot, Dielectric or Dieterici), Van der Waals equation expressed in virial form and calculation of Boyle temperature, critical temperature, critical pressure, critical volume and their determination. Isotherms of real gases and their comparison with Van der Waals isotherms, continuity of states, relationship between critical constants and Van der Waals constants, law of corresponding states, reduced equation of state.

October	Unit – IV Basics of Organic Chemistry and Stereochemistry: Electronic displacements and their applications, reactive intermediates, types of organic reactions and energy considerations. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies). Stereoisomerism: Optical activity and optical isomerism, asymmetry, chirality, enantiomers, diastereomers. Specific rotation, configuration and projection formulae: Newmann, Sawhorse, Fischer and their interconversion. Chirality in molecules with one and two stereocentres: meso configuration, racemic mixture and their resolution. Relative and absolute configuration: D/L and R/S designations. Geometrical isomerism: cis-trans, syn-anti and E/Z notations using CIP rules.
November	Assignments Viva Test Revision MDU examination (19/11/2025 onwards)
December	MDU examination Winter break (21/12/25 to 31/12/25)

LESSON PLAN

Session: 2025-26

Name of teacher- Dr. Urmila

Class Course: B.Sc (Physical Science)1st SEMESTER

Code: - 24CHE401MI01

Subject- (Minor Course) Basic Concepts of Chemistry

Month	Syllabus
July	Unit – I 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	Unit – II 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	Unit – III 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	Unit – IV 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.
November	Assignments Viva Test Revision MDU examination (19/11/2025 onwards)
December	MDU examination

	Winter break (21/12/25 to 31/12/25)
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LESSON PLAN

Session: 2025-26

Name of teacher- Dr. Urmila

Class Course: B.Sc (Physical Science) 3rd SEMESTER

Code: - 25CHE402MI01

Subject- (Minor Course) Chemistry of Metals & Non-Metals, Hydrocarbons and Solutions

Month	Syllabus
July	Unit – I Metal and Non-Metals Occurrence of elements in nature, physical and chemical properties of metals and non-metals, minerals and ores, metallurgical processes (benefaction, roasting, calcination and reduction of metal oxides processes), refining of metals, metallurgy of Fe, Zn, Al and Cu.
August	Unit – II Solution Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, Raoult's law, colligative properties - relative lowering of vapour pressure, elevation of boiling point, depression in freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Van't Hoff factor.
September	Unit – III Hydrocarbons Alkanes: General methods of preparation and Reactions: free radical substitution. Alkenes: General methods of preparation and Reactions: cis-addition (alk. KMnO ₄) and trans-addition (bromine), addition of HX (Markownikoff's and anti-Markownikoff's addition), hydration, ozonolysis, oxymercuration-demercuration, hydroboration oxidation. Alkynes: General methods of preparation and Reactions: formation of metal acetylides and acidity of alkynes, addition of bromine and alkaline KMnO ₄ , ozonolysis and oxidation with hot alk. KMnO ₄ , hydration to form carbonyl compounds.
October	Unit – IV Aromatic Hydrocarbons Structure of benzene (Kekule, hybrid and resonance), preparation of benzene. Reactions: electrophilic substitution reactions in benzene citing examples of nitration, halogenation, sulphonation and Friedel-Craft's alkylation and acylation with special emphasis on carbocationic rearrangement, side chain oxidation of alkyl benzene.

November	Assignments Viva Test Revision MDU examination (19/11/2025 onwards)
December	MDU examination Winter break (21/12/25 to 31/12/25)