Lesson Plan

Name of the Faculty	:	Dr. Jasbir
Class	:	B. Sc- I
Semester	:	First Semester (2025-26)
Subject	:	Chemistry-1
Paper Code	:	B-CHE-101, B-CHE-103

Lectures	Topic (including assignment and test)
July & August 2025	Atomic Structure: Dual behaviour of matter and radiation, de Broglie's relation, senberg's uncertainty principle, concept of atomic orbitals, significance of quantum nbers, radial and angular wave functions, normal and orthogonal wave functions, ificance of W and W2, shapes of s, p, d, orbitals, Rules for filling electrons in various orbi ctive nuclear charge, Slater's rules. Periodic table and atomic properties: Classification o iodic table, definition of atomic and ionic radii, ionisation energy, electron affinity and tronegativity, trend in periodic table (in s and p-block elements), Pauling, Mullikan, Allre how and Mullikan Jaffe's electronegativity scale, Sanderson's electron density ratio. **MDC** Atomic Structure and Bonding: Introduction, Elementary introduction of atomic structure and chemical bonding, Representation of elements/ atoms, Lewis structure, electronic configurations. **MDC Practical** Identify the pH of the given samples through pH strip.
September 2025	Structure and Bonding: Localized and delocalized chemical bond, Van der Waals interactions. Concept of resonance and its applications, hyperconjugation , inductive effect, Electromeric effect and their comparison. Mechanism of Organic Reactions: Curved arrow notation, homolytic and heterolytic bond fission. Types of reagents: electrophiles and nucleophiles. **MDC** Carbon and Its Compounds: Introduction, Tetravalency of Carbon, allotropes of carbon and their properties, hydrocarbons, nomenclature (linear compounds), Applications of hydrocarbons.

October 2025	Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization and Pericyclic reactions. Reactive intermediates: Carbocations, carbanions, free radicals, carbenes (structure & stability). Liquid State: Structure of liquids, Properties of liquids — surface tension, refractive index, viscosity, vapour pressure and optical rotation. **MDC** Polymers: Introduction, elementary idea of synthetic and natural polymers, Homo polymers and copolymers, uses and properties (Natural rubber, Vulcanized rubber, Polyethene, PVC, Styrene, Teflon, PAN, Nylon-66). Experiments related to persevering food items.
November & December 2025	Solid State: Classification of solids, Law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry and symmetry elements, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of Laue method, rotating crystal method and powder pattern method. **MDC** Food Preservatives: Elementary idea of natural and synthetic food preservatives, rancidity, uses and properties, different food preservation processes (pickle, Jam), artificial sweeteners, uses and properties. Preparation of Artificial Silk. To synthesize some polymers asper available resources.

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Lesson Plan

Name of the Faculty : **Dr. Jasbir**
Class : **B.Sc- II**
Semester : **Third Semester (2025-26)**
Paper Code : **B-CHE-301**

Lectures	Topic (including assignment and test)
July & August 2025	S and P-Block Elements Salient features of hydrides, oxides, halides, hydroxides of s-block elements (methods of preparation excluded). Structure, preparation and properties of Diborane and Borazine. Catenation, carbides, fluorocarbons, silicates (structural aspects), structure of oxides of Nitrogen and Phosphorous, structure of white and red phosphorus. Structure of oxyacids of Nitrogen, phosphorous, sulphur and chlorine and comparison of acidic strength of oxyacids. low chemical reactivity of noble gases, chemistry of xenon, structure and bonding in fluorides, oxides and oxyfluorides of xenon.
September 2025	Electrochemistry-I: Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance, equivalent conductance and relation among them, their variation with concentration. Application of Kohlrausch' s Law in calculation of conductance of weak electrolytes at infinite dilution (Numericals) Concepts of pH and pKa, Buffer solution, Buffer action, Henderson — Hazel equation, Buffer mechanism of buffer action.
October 2025	Electrochemistry-II: Reversible& irreversible cells, Calculation of thermodynamic quantities of cell reaction (AG, AH & K). Types of reversible electrodes — metal- metal ion, gas electrode, metal — insoluble salt- anion and redox electrodes. Nernst equation, Standard Hydrogen electrode, reference electrodes, Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode.
November & December 2025	Revision & Semester Exams

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Lesson Plan

Name of the Faculty	:	**Dr. Jasbir**
Class	:	**B.Sc- III**
Semester	:	**Fifth Semester (2025-26)**
Paper Code	:	**CHE 301A, CHE 301C, & CHP 301**

Lectures	Topic (including assignment and test)
July & August 2025	**Organic Chemistry:** 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. **Inorganic Chemistry :** Metal-ligand Bonding in Transition Metal Complexes: Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field split ting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters. **Chemistry Practical:** Semimicro qualitative analysis of mixture containing not more than four radicals (including interfering, Combinations and excluding insoluble): Pb^{2+}, Hg^{2+}, Hg_2^{2+}, Ag^{+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, As^{3+}, Sb^{3+}, Sn^{2+}, Fe^{3+}, Cr^{3+}, Al^{3+}, Thin Layer Chromatography: Determination of R_f values and identification of organic compounds (a) Separation of green leaf pigments (spinach leaves may be used) (b) Separation of a mixture of colored organic compounds using common organic solvents.
September 2025	**Organic Chemistry:** NMR Spectroscopy-II: Discuss ion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1,1-bromoethane, 1,1,2-tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone. Problems on PMR spectroscopy. Carbohydrates-II: An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination. Organometallic Compounds: Organ magnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions. **Inorganic Chemistry :** 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). **Chemistry Practical:** Semimicro qualitative analysis of mixture containing not more than four radicals (including interfering, Combinations and excluding insoluble): , Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}, NH_4^{+}, CO_3^{2-}, S^{2-}, SO_3^{2-}, $S_2O_3^{2-}$, NO_2^{-}, CH_3COO^{-}, Cl^{-}, Br^{-}, I^{-}, NO_3^{-}, SO_4^{2-}, $C_2O_4^{2-}$, PO_4^{3-}, BO_3^{3-}

October 2025	**Organic Chemistry:** Carbohydrates-I: Classification and nomenclature. Monosaccharides, mechanism of Osazone formation, interconversion 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 glycosides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose. **Inorganic Chemistry :** Magnetic Properties of Transition Metal Complexes Types of magnetic behavior, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of $_s$ and $_{eff}$ values, orbital contribution to magnetic moments. 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 d_1 and d_9 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion. **Chemistry Practical:** Steam distillation: Naphthalene from its suspension in water Separation of *o*-and *p*-nitrophenols, Column chromatography: Separation of fluorescein & methylene blue Separation of leaf pigments of spinach leaves.
November & December 2025	Revision Class Tests & Semester Exams

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