**Lesson Plan [Academic Session 2023-2024]**

**Class: B. Sc. Second Year [III Semester]**

**Subject: (CH-203) Organic Chemistry**

**Ms. Kirna Devi, Lecturer of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Alcohols:** Monohydric alcohols: nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols. Dihydric alcohols: nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4] and pinacol-pinacolone rearrangement. | Introduction of Syllabus and Course outcomes  Test to identify Slow and Advanced Learners  Doubt solving sessions |
| **September,2023** | **Carboxylic Acids & Acid Derivatives**: Nomenclature of Carboxylic acids, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Mechanisms of esterification and hydrolysis (acidic and basic). | Assignment on Alcohols  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Phenols:** Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols-electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe’s reaction and Schotten and Baumann reactions.**Epoxides**: Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides. **Ultraviolet (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. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. | Class Test on Carboxylic acid and its derivatives  Discussion on Test  Doubt solving sessions  Presentation of students  Discussion of Previous Years Questions |
| **November, 2023** | **Ultraviolet (UV) absorption spectroscopy:** UV spectra of conjugated enes and enones,Woodward- Fieser rules, calculation of max of simple conjugated dienes and unsaturated ketones. Applications of UV Spectroscopy in structure elucidation of simple organic compounds.  **Revision of syllabus** | Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2023-24]**

**Class: B. Sc. Second Year [III Semester]**

**Subject: (CH-202) Physical Chemistry**

**Ms. Kirna Devi, Lecturer of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Thermodynamics:** Definition of thermodynamic terms: system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Thermodynamic equilibrium, Concept of heat and work. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September,2023** | **Thermodynamics:** First law of thermodynamics: statement, concepts of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule–Thomson coefficient for ideal gas and real gas and inversion temperature. Calculation of w,q, dU&dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process. | Assignment on various topics of Thermodynamics  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Chemical Equilibrium:**Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant. Clausius–Clapeyron equation and its applications.  **Distribution Law:**Nernst distribution law – its thermodynamic derivation, Applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride | Class Test of Chemical Equilibrium  Discussion on Test  Doubt solving sessions  Discussion of Previous Years Questions |
| **November, 2023** | **Distribution Law:**(ii) Determination of equilibrium constant of potassium tri-iodide complex and (iii) Process of extraction. More stress on numerical problems.**Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2023-24]**

**Class: B. Sc. Third Year [V Semester]**

**Subject: (CH-303) Organic Chemistry**

**Ms. Kirna Devi, Lecturer of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Carbohydrates:** Classification and nomenclature of Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threodiastereomers. Conversion of glucose into mannose. Formation of glycosides, 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. An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September,2023** | **Organometallic Compounds:** Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions. | Assignment on Carbohydrates.  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **NMR Spectroscopy:**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. | Class Test of Organometallic Compounds  Discussion on Test  Doubt solving sessions  Discussion of Previous Years Questions |
| **November, 2023** | **NMR Spectroscopy:** 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. **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic session 2023-24]**

**Class: B. Sc. Third Year [V Semester]**

**Subject: (CH-302) Physical Chemistry**

**Ms. Kirna Devi, Lecturer of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Physical Properties and Molecular Structure:**Optical activity, polarization-(Clausius-Mossotti equation derivation excluded). Orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules, Magnetic permeability, magnetic susceptibility and its determination. Application of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetism | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September,2023** | **Spectroscopy:** Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Born-oppenheimer approximation, Degrees of freedom.  **Rotational Spectrum:** Selection rules, Energy levels of rigid rotator (semi-classical principles), rotational spectra of diatomic molecules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length and isotopic effect. | Sessional Test of Physical Properties and Molecular Structure  Discussion on Test  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Vibrational spectrum:** Selection rules, Energy levels of simple harmonic oscillator, pure vibrational spectrum of diatomic molecules, determination of force constant and qualitative relation of force constant and bond energy, idea of vibrational frequencies of different functional groups.  **Raman Spectrum:**Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, Quantum theory of Raman spectra  **Quantum Mechanics-I:**Black-body radiation, Plank’s radiation law, photoelectric effect, postulates of quantum mechanics, quantum mechanical operators, commutation relations, Hamiltonian operator, | Doubt solving sessions  Discussion of Previous Years Questions |
| **November, 2023** | **Quantum Mechanics-I:**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 particle in one dimensional box. **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2023-2024]**

**Class: B. Sc. First Year [I Semester]**

**Subject: (**B23-CHE-103**) Minor Chemistry - I**

**Ms. Kirna Devi, Lecturer of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Chemical Kinetics**  Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction, integrated rate expression for zero, first, second order reactions (for equal cone. Of reactants), Half-life period of a reaction. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September, 2023** | **Alkanes (upto 5 carbon atoms)**  Alkanes, nomenclature, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation: Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties. Mechanism of free radical halogenation of alkanes: reactivity and selectivity. | Assignment on Chemical Kinetics  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Covalent Bond**  Valence bond theory approach, shapes of simple inorganic molecules and ions based on valence shell electron pair repulsion (VSEPR) theory and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Molecular orbital theory of homonuclear (N2, O2)and heteronuclear (CO and NO) diatomic molecules, dipole moment and percentage ionic character in covalent bond. | Mid term exam on Alkanes.  Discussion on Mid term exam.  Doubt solving sessions  Presentation of students  Discussion of Previous Years Questions |
| **November, 2023** | **Metallic Bond and semiconductors**  Metallic bond -Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators).  Semiconductors-Introduction, types, and applications.  **Revision of syllabus** | Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2023-2024]**

**Class: B. Sc. First Year [I Semester]**

**Subject: (B23-VAC-201) Environmental Studies**

**Ms. Kirna Devi, Lecturer of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Introduction to environmental studies:** Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.  **Ecosystems:** Definition, structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs, Major ecosystems types: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystem (lakes, rivers, oceans). | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September,2023** | **Natural resources: Renewable and Non- renewable Resources**: Land resources: Land degradation and soil erosion.Forest resources: Importance of forests, deforestation: causes and impacts on environment. Water resources: Use and over- exploitation of surface and ground water. Energy resources: Renewable and non- renewable energy sources.  **Biodiversity and Conservation:** Definition and its types, Endangered and endemic species of India. Threats to biodiversity: Habitat loss, poaching of wildlife, man- wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex- situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational values. | Assignment on Ecosystem.  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Environmental pollution:** Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution. Solid waste management: Sources, methods of disposal: Landfill, incineration and composting. Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.  **Environmental Policies & Practices**: Environmental laws: Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution) Act, 1981, Water (Prevention and control of Pollution) Act, 1974. | Mid term exam on Biodiversity and Conservation  Discussion on Mid term exam.  Doubt solving sessions  Presentation of students  Discussion of Previous Years Questions |
| **November, 2023** | **Human Communities and the Environment:** Human population growth: Impacts on environment, human health and welfare. Resettlement and rehabilitation of project affected person. Disaster management: floods, earthquake, cyclones, landslides and drought. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.  **Revision of syllabus** | Discussion of Previous Years Questions |