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

**Class: B. Sc Second Year [IV semester]**

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

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

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| **Month** | **Topic** | **Academic Activities** |
| **January, 2024** | **Amines :** Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds. Gabriel phthalimide reaction, Hofmann bromamide reaction.  Electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **February, 2024** | **Aldehydes and Ketones:** Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, advantage of oxidation of alcohols with chromium trioxide (Sarett reagent) pyridinium chlorochromate (PCC) and pyridinium dichromate. Physical properties, Comparison of reactivities of aldehydes and ketones. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction.Oxidation of aldehydes, Baeyer– Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, WolffKishner, LiAlH4 and NaBH4 reductions | Test of chapter : Amines  Discussion on Test  Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2024** | **Infrared (IR) absorption spectroscopy:**  Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds. | Doubt solving sessions  Presentation of students  Discussion of Previous Years Questions |
| **April, 2024** | **Diazonium Salts**: Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO2 and CN groups, reduction of diazonium salts to hyrazines, coupling reaction and its synthetic application.  **Revision of Syllabus.** | Discussion of Previous Years Questions |

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

**Class: B. Sc Second Year [IV semester]**

**Subject: (CH-205) Physical Chemistry**

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

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| **Month** | **Topic** | **Academic Activities** |
| **January, 2024** | **Thermodynamics:** Second law of thermodynamics, need for the law, different statements of the law, Carnot’s cycles and its efficiency, Carnot’s theorm, Thermodynamics scale of temperature. Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, entropy as a criteria of spontaneity and equilibrium. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **February, 2024** | **Thermodynamics:** Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, G as criteria for thermodynamic equilibrium and spontaneity, its advantage over entropy change. Variation of G with P, V and T. | Assignment on various topics of  Thermodynamics Discussion on Assignment  Doubt solving sessions Discussion of Previous Years Questions |
| **March, 2024** | **Electrochemistry:** Electrolytic and Galvanic cells – reversible & irreversible cells, conventional representation of electrochemical cells. Calculation of thermodynamic quantities of cell reaction (▲G, ▲H & K).  Types of reversible electrodes – metal- metal ion, gas electrode, metal –insoluble salt- anion and redox electrodes. | Class Test of Chemical Equilibrium  Discussion on Test Doubt solving sessions Discussion of Previous Years Questions |
| **April, 2024** | **Electrochemistry:** Electrode reactions, Nernst equations, derivation of cell EMF and single electrode potential. Standard Hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, Concentration cells with and without transfe rence, liquid junction potential and its measurement.Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode. 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 [VI semester]**

**Subject: (CH-306) Organic Chemistry**

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

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| **Month** | **Topic** | **Academic Activities** |
| **January, 2024** | **Organic Synthesis via Enolates:** Acidity of α-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate.  **Heterocyclic Compounds:** Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. | Introduction of Syllabus and Course outcomes Doubt solving sessions  Discussion of Previous Years Questions |
| **February, 2024** | **Heterocyclic Compounds:** Introduction to condensed five and six- membered heterocycles. Prepration and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline. | Assignment on Heterocyclic Compounds.  Discussion on Assignment Doubt solving sessions Discussion of Previous Years Questions |
| **March, 2024** | **Amino Acids, Peptides & Proteins:** Classification, of amino acids. Acid-base behavior, isoelectric -amino acids.α point and electrophoresis. Preparation of Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid– phase peptide synthesis. Structures of peptides and proteins: Primary & Secondary structure. | Doubt solving sessions Discussion of Previous Years Questions |
| **April, 2024** | **Synthetic Polymers:** Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins. Natural and synthetic rubbers.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

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

**Class: B. Sc Third Year [VI semester]**

**Subject: (CH-305) Physical Chemistry**

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

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| **Month** | **Topic** | **Academic Activities** |
| **January, 2024** | **Phase Equilibrium**: Statement and meaning of the terms:phase, component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system–Example – water system. Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilverisation of lead. | Introduction of Syllabus; Programme and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **February,2024** | **Photochemistry:** Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus-Drapper law, StarkEinstein law (law of photochemical equivalence), Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes | Assignment of Phase Equilibrium  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2024** | **Solutions, Dilute Solutions and Colligative Properties**: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, Dilute solutions, Raoult’s law. Colligative properties: (i) relative lowering of vapour pressure (ii) Elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure. Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point. Applications in calculating molar masses of normal, dissociated and associated solutes in solution. | Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2024** | **Introduction to statistical mechanics**: Need for statistical thermodynamics, thermodynamic probability, Maxwell Boltzmann distribution statistics, Born oppenheimer approximation, partition function and its physical significance. Factorization of partition function.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |