Name of the Teacher: **Gulshan Singh** Class: **B. Sc- III year (Semester-V)**

**Organic Chemistry**

**Lesson Plan**

|  |  |  |  |
| --- | --- | --- | --- |
| **S No** | **Period** | **Topics to be Covered** | **Academic Activity to be Organized** |
|  | **17-31 July 2017** | **Theory:**  **NMR Spectroscopy**  Principle of nuclear magnetic resonance, the PMR  spectrum, number of signals, peak areas, equivalent and non-equivalent protons positions of signals and chemical shift, shielding and deshielding of protons, proton counting  **Practicals:**  **Synthesis of organic compounds:**  (a) To prepare salicylic acid from Aspirin.  (b)To prepare p-bromoaniline from p- bromoacetanilide. | **Class Tests, Group Discussions & Experiment Presentations** |
|  | **01-31 Aug 2017** | **Theory:**  **NMR Spectroscopy**  Splitting of signals and coupling constants, magnetic equivalence of protons. Discussion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1,1-dibromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone. Simple problems on PMR spectroscopy for structure determination of organic compounds.  **Practicals:**  **Synthesis of organic compounds:**  (a) To prepare m-nitroaniline from m-dinitrobenzene.  (b) To prepare S-Benzyl-iso-thiouronium chloride from Thiourea. |
|  | **01-30 Sept 2017** | **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 threo diastereomers. Conversion of glucose into mannose. Formation of glycosides.  **Practicals:**  **Thin Layer Chromatography**  Separation, Identification and Rf determination of a mixture of coloured organic compounds using common organic solvents. |
|  | **01-31 Oct 2017** | **Carbohydrates**  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.  **Practicals:**  To determine the strength of the given acid solution (mono acid only) conductometrically.  2. To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically. |
|  | **01-13 Nov 2017** | **Organometallic Compounds**  Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.  **Practicals:**  To determine the strength of given Ferrous ammonium sulphate solution potentiometrically. |

**Topics of Assignments/ Class Tests to be given to the Students:**

|  |  |
| --- | --- |
| **Assignment 1** | Principle of nuclear magnetic resonance, Chemical shift and factors affecting Chemical Shift |
| **Assignment 2** | Discussion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1,1-dibromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone. |
| **Class Test** | Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. |

Name of the Teacher: **Gulshan Singh** Class: **B. Sc- II year (Semester-III)**

**Organic Chemistry**

**Lesson Plan**

|  |  |  |  |
| --- | --- | --- | --- |
| **S No** | **Period** | **Topics to be Covered** | **Academic Activity to be Organized** |
|  | **17-31 July 2017** | **Theory:**  **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.  **Practicals:**  **Preparations:** Preparation of Cuprous chloride, tetra ammine cupric sulphate | **Class Tests, Group Discussions & Experiment Presentations** |
|  | **01-31 Aug 2017** | **Theory:**  **Phenols**  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.  **Practicals:**  **Preparations:** Preparation of chrome alum, potassium trioxalatochromate (III) and Nickel Hexammine chloride  **Colorimetry:**  To verify Beer - Lambert law for KMnO4 /K2Cr2O7 and determine the concentration of the given KMnO4 /K2Cr2O7 solution. |
|  | **01-30 Sept 2017** | **Theory:**  **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. UV spectra of conjugated enes and enones,Woodward- Fieser rules, calculation of λmax of simple conjugated dienes and α,β -unsaturated ketones. Applications of UV Spectroscopy in structure elucidation of simple organic compounds.  **Practicals:**  **Gravimetric Analysis:**  Quantitative estimations of, Cu2+ as copper thiocyanate, Ni2+ as Ni-dimethylglyoxime |
|  | **01-31 Oct 2017** | **Theory:**  **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.  **Practicals:**  1. To determine the CST of phenol-water system.  2. To determine the solubility of benzoic acid at various temperatures and to determine the ΔH of the dissolution process.  3. To determine the enthalpy of neutralisation of a strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base.  4. To determine the enthalpy of solution of solid calcium chloride. |
|  | **01-13 Nov 2017** | **Theory:**  **Carboxylic Acids & Acid Derivatives**  Relaive stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Mechanisms of esterification and hydrolysis (acidic and basic).  **Practicals:**  1. To determine the enthalpy of neutralisation of a weak acid/weak base and determine the enthalpy of ionisation of the weak acid/weak base.  2. To determine the enthalpy of solution of solid calcium chloride. |

**Topics of Assignments/ Class Tests to be given to the Students:**

|  |  |
| --- | --- |
| **Assignment 1** | Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols |
| **Assignment 2** | Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts |
| **Class Test** | Reactions of phenols-electrophilic aromatic substitution. Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe’s reaction and Schotten and Baumann reactions.Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides. |

Name of the Teacher: **Gulshan Singh** Class: **B. Sc- I year (Semester-I)**

**Organic Chemistry Practical**

**Lesson Plan**

|  |  |  |  |
| --- | --- | --- | --- |
| **S No** | **Period** | **Topics to be Covered** | **Academic Activity to be Organized** |
|  | **17-31 July 2017** | **Practical:**  To study the process of (i) sublimation (ii) Crystallization of camphor and phthalic acid | **Group Discussions, Experiment Presentations** |
|  | **01-31 Aug 2017** | **Practical:**  Preparation and purification through crystallization or distillation and ascertaining their purity through melting point or boiling point   1. Iodoform from ethanol (or acetone) 2. *m*-Dinitrobenzne from nitrobenzene (use 1:2 conc. HNO3-H2SO4 mixture if fuming HNO3 is not available) |
|  | **01-30 Sept 2017** | **Practical:**  Preparation and purification through crystallization or distillation and ascertaining their purity through melting point or boiling point   1. p-Bromoacetanilide from acetanilide 2. Dibenzalacetone from acetone and benzaldehyde 3. 2,4-DNP derivative of Benzophenone/Acetophenone. |
|  | **01-31 Oct 2017** | **Practical:**   1. To determine the surface tension of at least two liquids using stalagmometer by drop no. and drop weight methods (Use of organic solvents excluded). 2. To determine the specific refractivity of at least two liquids. |
|  | **01-13 Nov 2017** | **Practical:**   1. To study the effect of surfactant on surface tension of water. 2. To determine the viscosity of at least two liquids by using Ostwald’s viscometer (Use of organic solvents excluded)**.** |

**Topics of Assignments/ Class Tests to be given to the Students:**

|  |  |
| --- | --- |
| **Assignment 1** | **----** |
| **Assignment 2** | **----** |
| **Class Test** | **----** |

Name of the Teacher: **Gulshan Singh** Class: **B. Sc- Home Science I year (Semester-I)**

**Introductory Chemistry**

**Lesson Plan**

|  |  |  |  |
| --- | --- | --- | --- |
| **S No** | **Period** | **Topics to be Covered** | **Academic Activity to be Organized** |
|  | **17-31 July 2017** | Concept of element, mixture and compound. Atomic and Molecular masses. | **Class Tests & Group Discussions** |
|  | **01-31 Aug 2017** | Mole concept and Molar masses, Normality, Molarity and mass percentage. Simple numerical problems based on them. Subatomic particles: Electrons, Protons and Neutrons, Atomic No., Atomic Weight, Bohr's model of an atom. Modern Periodic Law and Periodic Table, Electronic configuration of elements (Na, Mg, C, N, O, F, C1, H). |
|  | **01-30 Sept 2017** | Periodic properties: Atomic size, Ionisation energy, Electron affinity and Electronegativity. Chemical Bonding: Ionic, Covalent, Coordinate and H-bonding. Concept of Acids, Bases & Salts, pH and pH Scale Numericals based on pH. Buffer solutions.  Carbon and its Characteristic: Tetravalency, Catenation, Isomerism, Electronegativity, Tendency to form multiple bonds. Organic compounds, Classification of organic compounds, Functional groups, |
|  | **01-31 Oct 2017** | IUPAC Nomenclature of Aliphatic Compounds (alkanes, alkenes, alkynes, alcohols, carboxylic acids, aldehydes & ketones). Classification of carbon atoms in alkanes. Soaps and synthetic detergents, advantages and disadvantages.  Synthetic Polymers: Structure and uses of the following polymers (PVC,Teflon, PAN, Nylon - 6, 6 Polyester). |
|  | **01-13 Nov 2017** | Chemical Composition in Cosmetics: Creams, Perfumes, Talcum Powder, Deodorants, Lipsticks, Nailpolish, Shampoo & Hair dye.  Paints and Varnishes their composition and uses. |

**Topics of Assignments/ Class Tests to be given to the Students:**

|  |  |
| --- | --- |
| **Assignment 1** | Normality, Molarity and mass percentage. Simple numerical problems based on them. |
| **Assignment 2** | IUPAC Nomenclature of Aliphatic Compounds (alkanes, alkenes, alkynes, alcohols, carboxylic acids, aldehydes & ketones). Classification of carbon atoms in alkanes |
| **Class Test** | Modern Periodic Law and Periodic Table, Electronic configuration of elements (Na, Mg, C, N, O, F, C1, H). |