**Lesson Plan [Academic Session 2020-2021]**

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

**Subject: (CH-103) Organic Chemistry**

**Dr. Ravish Kumar Chauhan, Associate Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **November, 2020** | **Structure and Bonding:** Localized and delocalized chemical bond, Van der Waal’s interactions, resonance: conditions, resonance effect and its applications, hyperconjugation, inductive effect, Electromeric effect & their comparison. | Introduction of Syllabus and Course outcomes  Doubt solving sessions |
| **December, 2020** | **Stereochemistry of Organic Compounds:** Concept of isomerism. Types of isomerism. Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, R & S systems of nomenclature. Geometric isomerism determination of configuration of geometric isomers. E & Z system of nomenclature, Conformational isomerism, conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds. Newman projection and Sawhorse formulae, Difference between configuration and conformation. | Test on topics of Structure and Bonding  Discussion on Test  Doubt solving sessions |
| **January, 2021** | **Mechanism of Organic Reactions:** Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Reactive intermediates: carbocations, carbanions, free radicals, carbenes, (formation, structure & stability). | Assignment of Stereochemistry  Discussion on Assignment  Doubt solving sessions |
| **February, 2021** | **Alkanes and Cycloalkanes:** IUPAC nomenclature of branched and unbranched alkanes, 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. Cycloalkanes, nomenclature, synthesis of cycloalkanes and their derivatives–photochemical (2+2) cycloaddition reactions, , dehalogenation of -dihalides, pyrolysis of calcium or barium salts of dicarboxylic acids, Baeyer's strain theory and its limitations., theory of strainless rings. **Syllabus Revision** | Discussion of Previous Years Questions and Important Topics  Discussion on Question paper pattern  Doubt solving sessions |

**Lesson Plan [Academic Session 2020-2021]**

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

**Subject: (CH-102) Physical Chemistry**

**Dr. Ravish Kumar Chauhan, Associate Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **November, 2020** | **Gaseous States:** Kinetic Molecular Theory of Gases, Maxwell’s distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (Derivations excluded), Deviation of Real gases from ideal behavior, Derivation of Van der Waal’s Equation of State, its application in the calculation of Boyle’s temperature (compression factor) | Introduction of Syllabus and Course outcomes  Doubt solving sessions |
| **December, 2020** | **Critical Phenomenon:** Critical temperature, critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Van der Waal’s equation, relationship between critical constants and Van der Waal’s constants. Critical compressibility factor. The Law of corresponding states. | Assignment on topics of Gaseous States  Discussion on Assignment  Doubt solving sessions |
| **January, 2021** | **Liquid States:** Structure of liquids, Properties of liquids: surface tension, refractive index, viscosity, vapour pressure and optical rotation. | Test of Critical Phenomenon    Discussion on Test  Doubt solving sessions |
| **February, 2021** | **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. **Revision of syllabus** | Discussion of Previous Years Questions and Important Topics  Discussion on Question paper pattern |

**Lesson Plan [Academic Session 2020-2021]**

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

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

**Dr. Ravish Kumar Chauhan, Associate Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **November, 2020** | **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  Doubt solving sessions |
| **December, 2020** | **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. | Test of Alcohols    Discussion on Test  Doubt solving sessions |
| **January, 2021** | **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 max of simple conjugated dienes and unsaturated ketones. Applications of UV Spectroscopy in structure elucidation of simple organic compounds. | Assignment on Ultraviolet (UV) absorption spectroscopy  Discussion on Assignment  Doubt solving sessions |
| **February, 2021** | **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, inter conversion of acid derivatives by nucleophilic acyl substitution. Mechanisms of esterification and hydrolysis (acidic and basic). **Revision of syllabus** | Discussion of Previous Years Questions and Important Topics  Discussion on Question paper pattern |

**Lesson Plan [Academic Session 2020-2021]**

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

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

**Dr. Ravish Kumar Chauhan, Associate Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **November, 2020** | **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. | Introduction of Syllabus and Course outcomes  Doubt solving sessions |
| **December, 2020** | **NMR Spectroscopy:** 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. | Assignment on NMR Spectroscopy  Discussion on Assignment  Doubt solving sessions |
| **January, 2021** | **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, 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. | Test of Carbohydrates    Discussion on Test  Doubt solving sessions |
| **February, 2021** | **Organometallic Compounds:** Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions. **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions  Discussion on Question paper pattern |