Basics of Organic Chemistry – I

Course Code: BEB206 **Credit: 04 (L-3, T-1, P-0)**
Contact Hours: 60 **MM: 100**

After going through the course the teacher trainee will be able to –

- Understand the Structure and Bonding on organic molecules
- Classify the various types of intermediates involved in organic reactions
- Assign the configuration and conformation to various molecules
- Classify the various types of nucleophilic and electrophilic reactions involved
- Apply the concepts to understand various compounds used in everyday life **Course Outline:**

Unit I: Bonding and Mechanism of Organic reactions

- Hybridizations, Bond lengths and bond angles, bond energy; Localized and delocalized chemical bond, vander Waals interactions, resonance, hyperconjugation, aromaticity, inductive and other field effects, hydrogen bonding.
- Curved arrow notations, drawing electron movement with arrows, half-headed and double-headed arrow, homolytic and heterolytic bond breaking, Reactive intermediates- carbocations, carbanions, free radicals and carbenes. Electrophiles and Nucleophiles. Types of organic reactions.

Unit II: Stereochemistry

- Concept of isomerism, types of isomerism, optical isomerism, elements of symmetry, molecular chirality, optical activity, enantiomers, diastereomers, meso compounds and racemization.
- Relative and absolute configurations, sequence rules, D &L, R & S systems of nomenclature.
- Geometric isomerism- Nomenclature E and Z system.
- Conformation, conformational analysis of ethane, propane and n-butane.
- Conformations of cyclohexanes, axial and equatorial bonds,
- Newman projection and Saw horse formulae, Fischer and Flying wedge formulae

Unit III: Alkanes, Alkenes and Alkynes

- IUPAC nomenclature, sources, methods of preparation, physical properties,
- Chemical reactions of alkanes, alkenes and alkynes and their mechanism

Unit IV: Cycloalkanes, Cycloalkenes and Dienes

- Nomenclature, Methods of formation, conformation and chemical reactions of cycloalkanes, cycloalkenes and Dienes.
- Nomenclature and classification of dienes: isolated conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions-1, 2 and 1, 4 additions, Diels-Alder reaction.

Unit V: Arenes and Aromaticity

- Nomenclature of benzene derivatives. Structure of benzene - molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure and MO picture. Concept of aromaticity, Huckel rule, aromatic ions.
- Mechanisms of SN1 & SN2 reaction, E1&E2 reaction (elementary treatment) of aliphatic hydrocarbon. Saytzeff & Hofmann elimation. Nucleophilic and electrophilic aromatic substitution. Energy profile diagrams. Activating and deactivating substituents. orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Methods of formation and chemical reactions of alkylbenzenes

Suggested Reading:

- Organic Chemistry, **Morrison and Boyd**, Prentice Hall.

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- Organic Chemistry, **L.G. Wade** Jr. Prentice Hall
- Fundamentals of Organic Chemistry **Solomons and Fryle**, John Wilev.
- Organic Chemistry, Vol. I, II and III **S.M. Mukherji, S.P. Singh and R.P. Kapoor**
- Organic Chemistry: **Morrison and Boyd**, Prentice Hall of India Pvt. Ltd. New Delhi
- Organic Chemistry, **Arun Bahl & B. S.Bahl**, S.Chand& Co. New Delhi □Standard Methods of Chemical Analysis, W.W. Scott, The Technical Press.
- Experimental Organic Chemistry, Vol.Iand II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
- Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.

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