ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

III SEMESTER   **CHEMISTRY** TIME:3HRS/WEEK

CH-Ma1-3201(3) **FUNDAMENTALS IN ORGANIC CHEMISTRY** MARKS:100

w.e.f 2024-2025 (23AK Batch) **SYLLABUS**

**COURSE OBJECTIVE:** The objective of the course is to introduce the fundamental aspects of chemistry pertaining to the structure, properties and reactivity of aliphatic and aromatic hydrocarbons, to students.

**COURSE OUTCOMES: By the end of the course, the student will be able to**

* 1. Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt
  2. Explain the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved
  3. Sketch organic reaction mechanisms and
  4. Correlate the stereo-chemical properties of organic compounds to their structure and functional groups and
  5. Identify the conditions necessary for aromaticity and examine the orientating influence of the substituents on aromatic rings.

**UNIT- I: STRUCTURAL THEORY IN ORGANIC CHEMISTRY: (9 h)**

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents). Reaction intermediates – Carbocations, carbanions & free radicals. Bond polarization: Factors influencing the polarization of covalent bonds, inductive effect - Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes.

### **UNIT- II: SATURATED HYDROCARBONS (ALKANES AND CYCLOALKANES) 9 H**

General methods of preparation of alkanes- Wurtz and Wurtz Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).

General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of monosubstituted cyclohexane.

### CH-Ma1-3201(3) ::2::

### **UNIT–III: Unsaturated Hydrocarbons (Alkenes and Alkynes) 9 h**

General methods of preparation, physical and chemical properties, Saytzeff and Hoffmann eliminations (with mechanism), Electrophilic Additions, (H2, HX) mechanism (Markownikoff/ Antimarkownikoff addition) with suitable examples-syn and anti-addition;addition of X2, HX. Oxymercuration demercuration, ozonolysis, hydroxylation, Diels Alder reaction, 1,2- and1,4-addition reactions in conjugated dienes. Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.

### **UNIT – IV: Benzene and its reactivity (9h)**

Structure of Benzene – Preparation - polymerisation of acetylene and decarboxylation

Properties -mechanism of electrophilic aromatic substitution of Friedel- Craft's alkylation and

acylation. halogenation and nitration,

### **UNIT – V: Orientation of aromatic substitution (9h)**

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropylium cation) Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO2 and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens.

### **II. List of Reference Books:**

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

\*\* \*\* \*\*