

<b>Course Title: Chemistry Core-2: General Organic Chemistry w.e.f. the session 2022-23 and onwards</b>	
<b>Class: M.Sc. Pt.-I / Semester-I</b>	<b>Course code: MCH-C102</b>
<b>Lectures: 60</b>	<b>Credits : 04</b>
<b>MM: 70</b>	<b>Exam Hours: 03</b>

**NOTE:** The question paper shall consist of Two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer (about 150 words) type questions of SIX marks each and student shall be required to attempt any five questions. Sec.-B shall contain 08 descriptive type questions of TEN marks each and student shall be required to attempt any four questions. Both sections shall have questions from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

## **COURSE CONTENTS:**

### **Unit - I**

#### **Organic Reaction Mechanism:**

**(a) Substitution or Displacement Reactions:** Nucleophilic and electrophilic substitutions with mechanism ( $S_N$  and  $S_E$ ), Frie's rearrangement, Friedel-Craft reactions, Reimer-Tiemann reaction, Chichibabin reaction.

**(b) Addition Reactions:** Electrophilic and nucleophilic additions with mechanism, hydroboration, Michael addition, Sharpless asymmetric epoxidation; aldol, Perkin, Stobbe condensations, Cannizzaro reaction, Wittig reaction.

### **Unit - II**

**Reaction Intermediates:** Carbocations, carbanions, free radicals, nitrines and benzyne, their formation, stability, detection and reactions.

**Molecular rearrangements:** Involving electron deficient carbon, nitrogen and oxygen viz- Pinacol-pinacolone, Wagner-Meerwein, Beckmann, Hofman, Lossen, Curtius, Schmidt rearrangements, Bayer-Villiger oxidation of ketones. Favorskii, Demjanov rearrangements.

### **Unit - III**

**Reagents in organic synthesis:** Use of the following reagents in organic synthesis: Gilman's reagents, lithium diisopropyl amide (LDA), 1,3-dithiane, osmium tetroxide, selenium dioxide.

**Heterocyclic Compounds:** Aromaticity, synthetic methods and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis.

### **Unit - IV**

**Pericyclic reactions:** Classification of Pericyclic reactions, Selection rules and stereochemistry of electrocyclic reactions, cycloaddition and sigmatropic shifts. Sommelet-Hauser, Cope and Claisen rearrangements, ene reaction.

**Photochemical reactions:** Cis-trans isomerization, Paterno-Buchi reaction, Norrish type I and II reactions of  $\alpha$ ,  $\beta$  unsaturated ketones, photoreduction of ketones, di-pimethane rearrangement, photochemistry of arenes.

### **Unit - V**

**Stereoisomerism:** Optical activity and Optical isomerism, Racemic mixture, Resolution, R-S nomenclature. Geometrical isomerism in the compounds containing C = C and C = N bonds, elementary idea of geometrical isomerism in cyclic compounds. E-Z nomenclature.

**Stereochemistry:** Asymmetric induction, prochiral relationships, stereoselective and stereospecific reactions and their use in reaction mechanism, Stereochemistry of substituted cycloalkanes.

#### **Suggested Readings:**

1. Organic Chemistry by: Boyd and Morrison
2. Organic Chemistry by: I.L.Finar
3. Organic Chemistry by: Kapoor, Singh and Mukherjee
4. Organic Chemistry by: Bruice

5. Organic Chemistry by: Pine
6. A Guide Book to Organic Reaction Mechanism by: Peter Sykes

### **COURSE OBJECTIVE:**

1. Organic Reaction Mechanism.
2. Reaction Intermediates.
3. Reagents in organic synthesis.
4. Heterocyclic Compounds
5. Pericyclic reactions
6. Photochemical reactions
7. Stereoisomerism
8. Stereochemistry

### **COURSE OUTCOMES:**

On completion of this course, student shall be able to:

CO 1: Understand the different organic reactions and their mechanism.

CO 2: Familiarize the various types of substitution reaction and their mechanism.

CO 3: Learn the concept of Reaction Intermediates.

CO 4: Explain the use of important reagents in organic reaction.

CO 5: Explain the pericyclic reactions and its classification.

CO 6: Describe the photochemical reaction.

CO 7: Describe the versatile knowledge of rearrangements.

#### **Mapping of Course outcomes (COs) with Programme outcomes (POs)**

Course outcomes/ Programme outcomes	1	2	3	4	5	6	7	8
CO 1	X				X		X	X
CO 2	X		X		X		X	X
CO 3	X						X	X
CO 4	X		X					X
CO 5	X		X				X	X
CO 6	X				X		X	
CO 7	X				X		X	X