Learning Objectives:

1. To use Newman and Saw-horse projections as 3D representations of different conformational isomers, use the terms, staggered, eclipsed, anti and gauche to describe different conformers.
2. To understand the techniques involved in the determination of mechanism of reactions and to propose methods to determine the mechanism of reaction.
3. To enable the student to understand and appreciate the importance of heterocyclic compounds.
4. To understand the techniques involved in the extraction and methods of determination of structure of alkaloids and terpenes.

Unit-1 OC 05: Conformational Analysis (Acyclic Systems) (15 hours)


Unit-2 OC 06: Reaction Mechanism-II (15 hours)

Nucleophilic aromatic substitution reactions: Aromatic nucleophilic substitution –SN1 (Ar), SN2 (Ar) and Benzyne mechanisms- evidence for the structure of Benzyne. Von-Richter rearrangement. Definition & types of Ambident nucleophiles. Neighboring group participation: criteria for determining the participation of neighboring group. Enhanced reaction rates, retention of configuration, isotopic labeling and cyclic intermediates. Neighboring group participation involving halogens, oxygen, sulphur, nitrogen, aryl, cycloalkyl groups, and σ and Π bonds. Introduction to nonclassical carbonium ions. Electrophilic substitution a saturated carbon: Mechanism of aliphatic electrophilic substitution. SE1, SE2 and SE3 and SET mechanism.

Unit-3 OC 07: Reactive Intermediates and Molecular Rearrangements (15 hours)

Reactive Intermediates: Generation, detection, structure, stability and reactions of carbocations, carbanions, carbenes, nitrenes & free radicals.

**Unit-4 OC 08: Heterocyclic Compounds & Natural Products** (15 hours)

**Heterocyclic Compounds:** Importance of heterocyclic compounds as drugs. Nomenclature of heterocyclic systems based on ring size, number and nature of hetero atoms. Synthesis and reactivity of indole, quinoline, isoquinoline.

**Natural Products:** Importance of Natural Products as Drugs. Isolation of Natural products by Steam Distillation, Solvent Extraction and Chemical Methods. General methods in the structure determination of Terpenes, isoprene rule, Structure determination and synthesis of camphor. General methods of structure determination of alkaloids. Structure determination and synthesis of quinine.

**Learning Outcomes:**

1. To apply the knowledge and skills of Conformational analysis, Synthetic Organic Chemistry, Reaction Mechanisms to prepare newer Compounds
2. To develop the ability to effectively apply knowledge of natural products and heterocyclic chemistry in the development of newer drugs.

**References:**

1. Stereochemistry of Carbon compounds by Ernest L Eliel / Samuel H. Wilen
2. Stereochemistry of organic compounds – Principles and Applications by D Nasipuri
3. The third dimension in organic chemistry, by Alan Bassindale
4. Stereochemistry: Conformation and Mechanism by P S Kalsi
5. Stereochemistry by V M Potapov
6. Advanced Organic Chemistry by Jerry March
7. Mechanism and Structure in Organic Chemistry S. Mukerjee
10. Comprehensive organic chemistry Vol.5 D.H.R.Barton
11. Chemistry of Natural Products by Bhat, Nagasampangi and Siva kumar
12. Alkaloids by Bentely
13. Steroid and Terpenoids by Bentely