

PANJAB UNIVERSITY, CHANDIGARH

B.Sc. SEMESTER-I

ORGANIC CHEMISTRY

UNIT-I

(8 Hrs.)

Structure and Bonding :

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond. Van der Waals interactions, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

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. Energy considerations.

Reactive intermediates-Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.

Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

UNIT-II

(7 Hrs.)

Alkanes and Cycloalkanes

Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and chemical reaction of alkanes.

Mechanism of free radical halogenation of alkanes : Orientation, reactivity and sensitivity. Cycloalkanes – nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitation. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring : banana bonds.

UNIT-III

(8 Hrs.)

Stereochemistry of Organic Compounds-I :

Concept of isomerism, Types of isomerism.

Optical isomerism – Elements of symmetry, molecular chirality, enantiomers, stereogenic center, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.

Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

UNIT-IV

(7 Hrs.)

Stereochemistry of Organic Compounds II :

Geometric isomerism : Determination of configuration of geometric isomers. E & Z system, nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism – Conformational analysis of ethane and *n*-butane ; conformation of cyclohexane, axial and equatorial bonds, conformation of mono and disubstituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation.