

FCYC203	Organic Chemistry-I	3-0-0	3
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#### Module-I

**Nomenclature of Organic molecules:** Brief revision, Nomenclature of polycyclic compounds including bridged, spiro and other special structures. [2hrs]

**Structure and Bonding:** Nature of bonding in aliphatic, alicyclic, aromatic and heterocyclic compounds; Aromaticity in benzenoid and non-benzenoid compounds. Alternant and non-alternant hydrocarbons; Dipole moment [6hrs]

#### Module-II

**Electronic Displacement in Organic Molecules:** Inductive and Field effects, Resonance; hyperconjugation, Steric inhibition of resonance, structural effects on acidity and basicity.

Types of reagents-Electrophiles, nucleophiles, Reactive Intermediates-Carbocations; carbanions; free radicals, radical anions and cations; arynes; carbenes and nitrenes (Introduction to structure, stability, and reactions). [4hrs]

#### Module-III

**Reaction Mechanism:** Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies)

Substitution reaction: Aliphatic substitutions: SN1, SN2, SN2' and SNi reactions; neighbouring group participation. Nucleophilic aromatic substitution (brief); Free radical substitutions (both aliphatic and aromatic) reactivity and selectivity of halogenations of alkane, electrophilic aromatic substitution (in detail); addition reaction (detailed stereochemistry of addition of H2, X2, HX type), Markownikoff and anti-Markownikoff addition, Eliminations: E1, E2, E1cB reactions (in detail), Elimination vs Substitution. [6hrs]

#### Module-IV

**Stereochemistry:** Conformational analysis of acyclic systems (Pitzer strain, A strain, etc.) and cyclohexane systems, axial and equatorial bonds, conformation of mono and disubstituted cyclohexane, Newman projection and sawhorse formula, Fischer and flying wedge formula, Introduction of terminologies such as erythro, threo, exo, endo, epimers, etc. Conformational analysis of decalins and other polycyclic compounds related to steroids.

Optical isomerism (in compounds containing more than one chiral centre, in biphenyls, allenes and spiro compounds), resolution of enantiomers, inversion, racemisation and retention

Relative and absolute configuration, sequence rule, D, L and R, S systems of nomenclature

Geometric isomerism: determination of configuration (cis, trans and E, Z), oximes and alicyclic compounds. [12hrs]

#### Essential readings:

1. March, J., Advanced Organic Chemistry, 4<sup>th</sup> ed, 1999.
2. Nasipuri, D., Stereochemistry of Organic Compounds, 2<sup>nd</sup> ed., 1995.
3. Solomons, T. W. G., Organic Chemistry 6<sup>th</sup> ed, 1996.
4. Sykes, Peter, A guide book to Mechanism in Organic Chemistry.
5. R. Bruckner, Advanced Organic Chemistry, 2002
6. R. Bruckner, Organic Mechanisms, 2010
7. M. B. Smith, Organic Synthesis, 3<sup>rd</sup> Ed. 2010