

## 7<sup>th</sup> semester

FCYC-----701	Organic Chemistry-V		
--------------	---------------------	--	--

### Module I

Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic).

**Reductions:** Stereochemistry, stereo selection and mechanism of catalytic hydrogenation and metal-liquid ammonia reductions, Reduction by dissolving metals,, Photo-reduction, Bio-reduction. Hydride transfer reagents: Sodium borohydride, Sodium cyanoborohydride, Lithium aluminium hydride, alkoxy substituted LAH reducing agents, DIBAL, BuLi, Application of Hydroboration (reductions, oxidations, carbonylations): Diborane, diisoamylborane, 9BBN, isopinocampheyl and diisopinocampheyl borane. Homogeneous hydrations: Mechanism and applications using Rh, Ru and other metal complexes.

**Oxidations:** Scope of the following oxidising agents with relevant applications and mechanism: DDQ, DCC, PCC, PDC, Osmium tetroxide, Selenium dioxide, KMnO<sub>4</sub>, tertiary-Butyl hydro peroxide. Manganese (IV) oxidants, Chromium (VI) oxidants, tertiary-Butyl hydro peroxide, Swern oxidation, Oxidation with per-acids, Enzyme or microbial oxidation (Bio-oxidation)

#### Some additional reagents

NBS, LDA, THF, Samarium (II) iodide (Kagan's reagent)

### Module II

Molecular rearrangements: General mechanistic considerations-nature of migration, Migratory aptitude, memory effects, A detailed study of the following rearrangements: Pinacol-Pinacolone, Wagner-Meerwein, Demjanov, Benzil-Benzilic acid, Favorskii, Arndt-Ester synthesis, The von Richter, Sommelet-Hauser and Smiles rearrangements, Neber, Beckmann, Hofman, Curtius, Schmidt, Bayer-Viliger, Fries rearrangement, Shapiro reaction, Free-radical rearrangement reactions.

### Module III

Reaction and mechanism of some important naming reactions

Appel reaction, Bayer-Viliger Oxidation, Bignelli reaction, Buchwald-Hartwig amination, Cannizzaro reaction, Claisen condensation, Claisen rearrangement, Clemmensen reduction, Corey-Kim oxidation, Dieckmann condensation, Dakin-West reaction, Diel-Alder reaction, Eschenmoser-Claisen rearrangement, *Eschweiler-Clarke methylation*, Finkelstein reaction, Fischer esterification, Friedel-Craft acylation/alkylation, Gabriel synthesis, Heck reaction, Hell-Volhard-Zilinsky reaction, Henry reaction, Ireland-Claisen rearrangement, Johnson-Claisen

rearrangement, Jones oxidation, Knoevenagel Condensation, Kolbe-Schmidt reaction, Kumada-cross coupling, Luche reduction, Mannich reaction, Michael addition, Misunobu reaction, Mukaiyama aldol addition, Negishi-cross coupling, Openauer oxidation, Pausan Khand reaction, Perkin reaction, Pictet-Spengler reaction, Prins reaction, Reformatsky reaction, Riemer-Tiemann reaction, Ritter reaction, Robinson annulation, Sandmeyer reaction, Schotten-Baumann reaction, Swern oxidation, Staudinger reaction, Sharpless epoxidation, Ullmann reaction, Vilsmeier-Haack reaction, Williamson ether synthesis, Wittig reaction, Wolff-Kishner reaction, Wolff rearrangement, Wurtz reaction. Yamaguchi esterification.

#### **Text Books:**

1. March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, Michael B. Smith, 7th Edition, Wiley, 2013.
2. Advanced Organic Chemistry Part A: Structure and Mechanisms, **Carey**, Francis A., **Sundberg**, Richard J, Fifth Edition, Springer International Edition, 2007.

#### **Reference Books:**

1. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Sixth Edition, John Wiley & Sons, Inc., New York, 1985.
2. Structure and mechanism in organic chemistry, von C. K. Ingold. Cornell Univ. Press, Ithaca. 1953
3. Organic Chemistry, R. T. Morrison and R. N. Boyd, Sixth Edition, Prentice-Hall, 1992.
4. Modern Organic Reactions, H. O. House, Benjamin-Cummings Publishing Co., Subs. of Addison Wesley Longman, US; 2<sup>nd</sup> edn, 1972.
5. Organic Synthesis: Clayden J., Greeves N, Warren S, and Wothers, Second Edition Oxford University Press, 2000.
6. Advanced Organic Chemistry Part A & B; **Carey**, F. A., **Sundberg**, R. J, Fifth Edition, Springer International Edition.
7. Principles of Organic Synthesis, R. O. C. Norman and J.M.Coxon, Third Edition, Blackie Academic and Professional