MCYC 302 Organic Chemistry-III (3-0-0) (3 Credits)

Module I (12 hours)

Green Chemistry: Principles, green solvents, concepts of atom economy, Domino and multi component reactions, green synthesis of pharmaceuticals and industrial chemicals.

Coupling Reactions: Carbon-carbon bond formation through coupling reactions (Heck, Suzuki, Stille and Sonogoshira), Carbon-hetero atom bond forming reactions using transition metals (Cu,Pd, Rh, Ru, Ni, Fe etc.)

Rearrengements:

General mechanistic considerations- nature of migration, migratory aptitude, memory effects,
A detailed study of the following rearrengements: Pinacol-pinacolone, Wagner-Meerwein, Demjanov, Benzil-Benzilic acid, Favorskii, Arndt-Eistert synthesis, Neber, Beckmann, Hofman, Curtius, Schmidt, Bayer-Villiger, Shapiro reaction. Free-radical rearrangement reactions.

Oxidation:

Introduction to various oxidative processes:
Hydrocarbons-alkenes, aromatic rings, saturated C-H groups (activated and unactivated), alcohols, diols, aldehydes, ketones, ketals and carboxylic acids, amines, hydrazines, and sulfides, oxidations with ruthenium tetraoxide, iodobenzene diacetate and thallium (III) nitrate.

Reduction:

Introduction to various reductive processes:
Alkenes, alkynes and aromatic rings, carbonyl compounds (aldehydes, ketones, acids and their derivatives), epoxides, nitro, nitroso, azo and oxime groups, hydrogenolysis.

Synthetic Strategies:

Umpolung reactivity – formyl and acyl anion equivalents. Selectivity in organic synthesis – chemo-, regio- and stereoselectivity. Concepts of asymmetric synthesis – resolution (including enzymatic), desymmetrization and use of chiral auxilliaries. Carbon-carbon bond forming reactions through enolates (including boron enolates), enamines and silyl enol ethers. Michael addition reaction. Stereoselective addition to C=O groups (Cram and Felkin-Anh models).

Heterocyclic Compounds:

Introduction to heterocycles, nomenclature, structure, preparation, properties and reactions of furan, pyrrole, thiophene, pyridine, indole, quinoline and isoquinoline.

Text and Reference Books:

1. Advanced Organic Chemistry Part A & B:, Carey, F. A., Sundberg, R. J, Fifth Edition, Springer International Edition.
2. Principles of Organic Synthesis, R. O. C. Norman and J.M.Coxon, Third Edition, Blackie Academic and Professional
3. March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, Michael B. Smith, Jerry March, Sixth Edition, John Wiley & Sons, Inc.
4. Organic Synthesis: Clayden J., Greeves N, Warren S, and Wouthers, Second Edition Oxford University
5. Heterocyclic Chemistry, Thomas. L. Gilchrist, Third Edition, 1997
6. Heterocyclic Chemistry, Joules J.A., Mills K., Smith G.F., Third Edition.
7. Advances in Heterocyclic Chemistry, Book Series Elsevier Edited by Alan Katritzky
8. Green Chemistry and Catalysis, Sheldon R.A., Arends I., Hanefeld Ulf, Wiley-VCH.
9. Green Chemistry: Theory and Practice, Anastas P.T, Warner J.C
10. New Trends in Green Chemistry, Ahluwalia V. K., Kidwai M.