

Course Code	Course Title	C	H	I	E	T
17P2CMC4	ORGANIC CHEMISTRY-II	4	4	25	75	100

UNIT I ADDITION TO CARBON-CARBON MULTIPLE BONDS 12 Hrs

Mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles, and free radicals, regio- and chemo- selectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic rings. Hydroboration. Michael reaction. Sharpless asymmetric epoxidation.

Additio to Carbon-Heteroatom Multiple Bonds: Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, acids esters, nitriles, Addition of grignard reagents. Organozinc and LiAlH₄. Addition reactions of carbonyl compounds-Wittig reaction.

Mechanism of condensation reaction involving enolates - Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions.

UNIT II STEREOCHEMISTRY 12 Hrs

Elements of symmetry, chirality, molecules with more than one chiral center, *threo* and *erythro* isomers, methods of resolution, optical purity, homotopic, enantiotopic and diastereotopic atoms, groups and faces, stereospecific and stereoselective synthesis. Asymmetric synthesis-Cram's and Prelog rule. Optical activity in the absence of chiral carbon (biphenyls, allenes and spiranes), chirality due to helical shape.

Stereochemistry of the compounds containing nitrogen and sulphur.

Conformational analysis of cyclohexane, mono- and di- substituted cyclohexanes, decalins, effect of conformation on reactivity.

UNIT III OXIDATION AND REDUCTION IN ORGANIC CHEMISTRY 12 Hrs

Oxidation: Introduction, Different oxidative processes-Hydrocarbons- alkenes, aromatic rings, saturated C-H groups (activated and unactivated), Alcohols, hydrazines and sulphides.

Oxidations using ruthenium tetroxide, iodobenzene diacetate and thallium (III) nitrate.

Reduction: Introduction. Different reductive processes-Hydrocarbons: alkanes, alkenes, alkynes and aromatic rings - Carbonyl compounds: aldehydes, ketones, acids and their derivatives. Epoxides, Nitro, Nitroso, azo and oxime groups.

UNIT IV REARRANGEMENTS 12 Hrs

General mechanism – nature of migration, migratory aptitude, memory effects.

Carbon-carbon migration: Wagner Meerwein, pinacol-pinacolone. Benzil-Benzilic acid, and dienone –phenol rearrangement.

Carbon-nitrogen migration: Beckmann, Hofmann, Schmidt, Lossen and Curtius rearrangements.

Carbon-oxygen migration: Baeyer-Villiger and Dakin rearrangements.

Rearrangements proceeding through carbanion: Stevens, Neber, Sommelet-Hauser and Favorski rearrangement.

UNIT V RETROSYNTHESIS

12 Hrs

Disconnection approach: Introduction to synthons and synthetic equivalents, disconnection approach, functional group interconversion, the importance of order of events in organic synthesis, one C-X, and two-group C-X disconnections, chemoselectivity, reversal of polarity,

Protecting groups - protection of alcohol, amine, carbonyl and carboxyl groups

One group C-C disconnections - alcohols and carbonyl compounds

Two group disconnections - Diels Alder reaction, Michael additions and Robinson annulations reactions.

Ring synthesis – Longifolene and Juvabione.

Text Book(s):

1. March, J., "Advanced Organic Chemistry", Sixth Edition, John Wiley & Sons, New York, 2007.
2. Skyes, P., "A Guide Book to Mechanism in Organic Chemistry", Sixth Edition, Pearson Education Ltd., New Delhi, 2011.
3. Finar, I.L., "Organic Chemistry", Vol. II, Sixth Edition, Pearson Education Pvt. Ltd., Singapore, 2006.
4. Clayden, J., Greeves, N., Warren, S. and Wothers, P., "Organic Chemistry", First Edition, Oxford University Press, New York, 2006.
5. Smith, M. B., "Organic Synthesis", Second Edition, McGraw-Hill International Edition, New Delhi, 1994.
6. Eliel, E.L., "Stereochemistry of Carbon Compounds", First Edition, McGraw Hill, New Delhi, 2007.
7. Warren, S. Designing Organic Synthesis (A programmed introduction to the synthon approach), John Wiley & Sons.
8. Norman, R. O. C., Coxon, J. M. Principles of Organic Synthesis, and Blackie Academic & Professional, 1988.

Reference Books:

1. Ireland, R.E., "Foundation of Modern Organic Chemistry Series- Organic Synthesis", First Edition, Prentice – Hall of India Pvt. Ltd., New Delhi, 1975.
2. Mackie, R.K., Smith, M.M., and Aitken, R.A., "Guide Book to Organic Synthesis" Second Edition, Longman Scientific and Technical, Singapore, 1990.
3. Bruckner, R., "Advanced Organic Chemistry – Reaction Mechanism", First Edition, Elsevier India Pvt. Ltd., New Delhi, 2005.
4. House, H.O., "Modern Synthetic Reaction", Second Edition, W.A. Benjamin, Inc., London, 1972.
5. Nasipuri, M., "Stereochemistry of Organic Compounds", Third Edition, New Age International, New Delhi, 2007.
6. Ahluvalia, V.K., "Chemistry of Natural Products", First Edition, Vishal Publishing Co, Jalandhar, 2008.
7. Carrutherus, W., "Some Modern Methods in Organic Synthesis", Third Edition, Cambridge University Press, New York, 1997.
8. Warren, S. Work book for organic synthesis, The Disconnection Approach John Wiley & Sons (Asia) Pvt. Ltd.