

**VEER NARMAD SOUTH GUJARAT UNIVERSITY M.Sc.-I (CHEMISTRY)
PROPOSED SYLLABUS TO BE EFFECTIVE FROM JUNE 2018**

PAPER-II (Organic Chemistry)

Max. Marks: 100 (External – 70 + Internal – 30)

Total Periods: 45

SEMESTER-I

UNIT-I: REACTION MECHANISM & REACTIVE INTERMEDIATES **12 periods**
Detailed study of organic reaction intermediates. Generation, structure, stability and reactions of –

Carbocations (Classical and non-classical): Phenonium ion, norbornyl system, common carbocation rearrangements- Demjanov, Pinacole-Pinacolone, Rupe.

Carbanions: Mechanism of condensation involving enolates - Aldol, Claisen, Mannich, Dieckmann, Michael and Shapiro reactions.

Carbenes: Mechanism of Arndt-Eistert reaction, Reimer-Tiemann reaction and Bamford Steven's rearrangement reaction.

Free Radicals: Allylic halogenation (NBS), coupling of alkenes and arylation of aromatic compounds by diazonium salts. Sandmeyer reactions. Free radical rearrangements, Hunsdiecker reaction.

Reference book:

1. Carbenes, Benzynes and Nitrenes by Gilchrist, T. L. and Rees.
2. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
3. Reaction Mechanism in Organic Chemistry by S. M. Mukherji and S. P. Singh (McMillan India Ltd., 1976).
4. Organic Chemistry (3/e) by J. B. Hendrickson, Donald J. Cram and George S. Hammond (McGraw-Hill Book Co. & Kogekusha Co. Ltd., 1970).
5. Organic Chemistry (5/e) by Morrison & Boyd (Prentice Hall).
6. Advanced Organic Chemistry by Carey & Sundberg (3rd edition).
7. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
8. Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Plenum.
9. Organic chemistry 2nd ed. Jonathan clayden, Nick greeves, Stuart Warren.
10. Reaction Mechanism and Reagents in Organic Chemistry by C. R. Chatwal (Himalaya Publishing House, Bombay, 1987).

UNIT-II: PERICYCLIC REACTIONS

11 periods

Introduction - Definition, Characteristics and Classification

Molecular orbitals and symmetry properties of ethylene, 1,3-butadiene, 1,3,5-hexatriene and allyl systems.

Electrocyclic Reactions: Woodward-Hoffman Correlation diagram and derivation of selection rules, Conrotatory and disrotatory motions, FMO and PMO approach for $4n$ and $(4n+2)$ electron system and allyl systems. □

Cycloaddition Reactions: Antarafacial and suprafacial additions. FMO and PMO approach for $4n$ and $(4n+2)$ electron systems (No correlation diagram), Diels-Alder reaction, stereoselectivity, Effect of substituents. □

Sigmatropic rearrangements: Suprafacial and antarafacial shifts involving H & C moieties, retention and inversion of configurations.

The Cope and Claisen rearrangements, Ene reaction, 1,3-dipolar cycloadditions.

Examples of electrocyclic, cycloaddition and sigmatropic rearrangements.

Reference book:

1. March's Advanced Organic Chemistry Reactions, Mechanisms, And Structure 7th ed. 2013

Michael B. Smith. Wiley.

2. Mechanism And Theory In Organic Chemistry-2007 by Thomas H. Lowry, Kathleen S. Richardson, Forbes. Harper & Row, Publishers. New York, Hagerstown, San Francisco, London.

3. Advanced Organic Chemistry Part A: Structure and Mechanisms by Carey & Sundberg (5th edition), 2000, Springer.

4. Pericyclic Reactions, S. M. Mukherji, Macmillan, India.

5. Photochemistry And Pericyclic Reactions 3rd ed. by Jagdamba Singh 2010. New Age International Publishers Ltd. New Delhi.

6. Pericyclic Reactions A mechanistic and problem solving approach Sunil Kumar, Vinod Kumar, S.P. Singh Academic Press 2015

UNIT-III; SUBSTITUTION AND ELIMINATION REACTIONS

11 periods

A: Aliphatic Nucleophilic Substitution: The SN_1 , SN_2 , SN_i mechanisms. Reactions of Allylic halides, neighbouring group participation by -OH, -NH₂, -COO-, -RS-, -halogen, aromatic ring.

B: Aromatic Nucleophilic Substitution: The SN_2 , SN_1 and benzyne mechanisms, Reactivity - effect of substrate structure, leaving group and attacking nucleophile, The Von Richter rearrangement.

C: Elimination reaction: Hoffmann and Zaitsev's rule of elimination, E1, E2 and E1CB Reaction mechanism and orientation.

Reference book:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Reaction Mechanism in Organic Chemistry by S. M. Mukherji and S. P. Singh (McMillan India Ltd., 1976).
3. Organic Chemistry (3/e) by J. B. Hendrickson, Donald J. Cram and George S. Hammond (McGraw-Hill Book Co. & Kogekusha Co. Ltd., 1970).
4. Organic Chemistry (5/e) by Morrison & Boyd (Prentice Hall).
5. Advanced Organic Chemistry by Carey & Sundberg (3rd edition).
6. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
7. Physical organic chemistry by Jack Hyne
8. Reaction mechanism by Jagdambasingh.
9. organic chemistry - Reaction mechanism, by P.S. Kalsi, New age international publishers.

UNIT-IV: Stereochemistry**11 periods**

A. Stereo chemical principles; Enantiomeric relationships; Distereomeric relationship; R-S and E-Z nomenclature; Dynamic stereochemistry; Chiral-Prochiral relationships; Stereo selective and Stereo specific reactions; Racemates and racemic modification, Resolution of racemic modification, Optical activity in the absence of chiral carbons biphenyl, allenes, spiranes.

B. Conformational Analysis: Interconversion of Fischer, Newman and Sawhorse projections. Newer method of asymmetric synthesis (including enzymatic and catalytic nexus), enantio and diastereo selective synthesis. Simple acyclic and cyclic (chair and boat cyclohexanes, Decalins, Perhydrophenanthrene) systems. Effects of conformation on reactivity in acyclic compounds and substituted cyclohexanes.

Reference book:

1. Advanced Organic Chemistry: Part A: Structure and Mechanisms; By Francis A. Carey, Richard J. Sundberg, fifth edition, Published by Springer.
2. Advanced Organic Chemistry: Part B: Reaction and Synthesis; By Francis A. Carey, Richard J. Sundberg, fifth edition, Published by Springer.
3. Stereochemistry of Carbon Compounds; By Ernest L. Eliel, Published by Tata McGraw-Hill Publishing Company Ltd.
4. Basic organic stereochemistry; By Ernest Ludwig Eliel, Samuel H. Wilen, Michael P. Doyle, Published by Wiley-Interscience.
5. Introduction to Stereochemistry; By Kurt Martin Mislow, Dover Publication INC.
6. Stereochemistry of Organic Compounds: Principles and Applications; By D. Nasipuri, New Age International (P) Ltd. Publisher.
7. Stereochemistry Conformation and Mechanism; By P.S. Kalsi, New Age International (P) Ltd. Publisher.
8. Basic Stereochemistry of Organic; By Subrata Sen Gupta, First edition, Published by Oxford University Press.