

Name of Faculty	:	Faculty of Science
Name of Program	:	Master of Science Chemistry
Course Code	:	1MSO02
Course Title	:	Organic Chemistry
Type of Course	:	Basic Science
Year of Introduction	:	2023-24

Prerequisite	:	Knowledge about hydrocarbons
Course Objective	:	Organic chemistry deals with research and development of organic materials, modify and study carbon-based materials to develop a product having a specific purpose for wider use. They also accomplish various scientific studies to identify or find applications for compounds for society. Many industries like pharmaceuticals, agriculture, paints, dyes, and many more prefer to employ organic chemists.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Understand rules of aromaticity of organic molecules
	CO2	Apply their understanding about the organic reactions of industrial significance with respect to the chemoselectivity, regioselectivity and enantioselectivity.
	CO3	Sketch organic molecules in different projection formula and assign its configuration.
	CO4	Analyze the product distribution and the stereochemistry of various organic products.
	CO5	Design organic reactions in order to achieve the required product(s)
	CO6	Evaluate the organic reactions based on the influence of the substituent on substrate molecules

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
SEE	CIA	SEE	CIA					
4	0	0	4	70	30	-	-	100

Legends: **L**-Lecture; **T**-Tutorial/Teacher Guided Theory Practice; **P** - Practical, **C** - Credit, **SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with COs
1	<p>A) Nature and Bonding in Organic Molecule: Delocalized chemical bonding, conjugation, cross conjugation, resonance, hyper-conjugation, acidity and basicity.</p> <p>B) Aromaticity: Aromaticity, aromatic character, Frost circle diagram for cyclobutadiene, benzene and others. Resonance and chemical stabilization-aromatic character based on NMR criteria, molecular orbitals, Huckel's molecular orbital(HMO)π Huckels rule, energy level of method, MO of simple organic systems such as ethene, allyl and butadiene Aromaticity in benzenoid and non-benzenoid compounds and charged rings, annulenes, fulvenes, azulenes, antiaromaticity and homoaromaticity.</p>	15	25%	CO1
2	<p>Types of Organic Reactions: Aliphatic nucleophilic substitution reactions: The SN1 and SN2 reactions and their mechanisms and Stereochemistry, Leaving group effect and reaction medium. Aliphatic electrophilic substitution reactions: SE1 and SE2 reactions, Their mechanism and stereochemistry. Aliphatic addition reactions: Addition reactions of alkenes and alkynes. Aliphatic elimination reactions: E1 and E2 mechanism, Zaitsev's rule, Dehydration ($-H_2O$) of alcohols, Dehydrohalogenation ($-HX$) of haloalkanes, Hoffman elimination</p>	15	25%	CO2
3	<p>Stereo Chemistry: Optical and geometrical isomerism, origin of chirality and chiral centre, axis and plane, helicity, Enantiotopic and diastereotopic atoms, groups and faces, prochiral centre, prochiral environments, chiral drugs. Stereo chemistry in additions to alkenes (Syn, Anti, Diels, -alder)</p>	15	25%	CO2 CO3 CO4
4	<p>(A) Reactive intermediates: (1) Carbocations stability, structure, generation and fate (2) Carbanions- stability, structure, generation and fate of carbanions (3) Carbenes-stability and structure, the generation and fate of carbenes. (4) Free radicals: stability, structure, generation and fate of free radicals, NBS (5) Nitrene : stability, structure, generation, reaction.</p>	15	25%	CO5 CO6

	<p>(B) Rearrangements: General mechanistic considerations, nature of migration, migratory aptitude, and memory effects in respect of following.</p> <p>(1) Carbon to Carbon migration of R, H and Ar</p> <p>(i) Pinacol- Pinacolone rearrangement</p> <p>(ii) Favorskii rearrangement</p> <p>(iii) Wagner-Meerwein rearrangement</p> <p>(2) Carbon to Nitrogen migrations:</p> <p>(i) Curtius rearrangement</p> <p>(ii) Schmidt rearrangement</p> <p>(iii) Lossen rearrangement</p>			
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Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	–	16.67	16.67	16.67	16.67	33.32

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested Learning Websites

Sr. No.	Name of Website
1	https://nptel.ac.in/courses/104106119
2	https://onlinecourses.nptel.ac.in/noc22_cy42
3	https://nptel.ac.in/courses/104105127

Reference Books

1	Organic Chemistry; Morrison, R. N. & Boyd, R. N.; Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
2	Organic Chemistry (Volume 1); Finar, I. L.; Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3	A Text Book of Organic Chemistry; Arun Bahl and B.S. Bahl; Sultan Chand & Sons, New Delhi
4	Organic Chemistry; Graham Solomons, T.W.; John Wiley & Sons, Inc.
5	Organic Chemistry Volume I; S M Mukherji, S P Singh, R P Kapoor; New Age International (P) Ltd.
6	Organic Chemistry Second Edition - Mehta and Mehta; PHI Learning Pvt. Ltd.
7	Advanced Organic Chemistry, Reactions Mechanisms and Structure, J. March, 6th Edition, John Wiley.
8	Carbenes, nitrenes and arynes, T.L. Gilchrist and C.W. Rees.
9	Guidebook to Mechanism in Organic Chemistry by Peter Sykes, 6th Edition, Prentice Hall.
10	Advanced Organic Chemistry Part A: Structure and Mechanism and Part B: Reaction and synthesis, Francis A. Carey, Richard J. Sundberg, 5th Edition, Springer.
11	Organic Chemistry, Johnathan Clayden, Nick Greeves, Stuart Warren, 1st Edition, Oxford University Press.
12	Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, 3rd Edition, Blackie Academic and



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	Professional.
13	Stereo Chemistry , P.S. Kalsi , New Age Publications.
14	Reagents in Organic Synthesis- Fieser and Fieser, John Wiley.
15	Physical Organic Chemistry by Jack Hynes,(plenum publication)
16	General Organic Chemistry by Sachin Kumar Ghose, New Central book agency.