

Name of Faculty	:	Faculty of Science
Name of Program	:	Master of Science
Course Code	:	2MSO02
Course Title	:	Organic Chemistry
Type of Course	:	Basic Science
Year of Introduction	:	2023-24

Prerequisite	:	Basic knowledge of organic chemistry
Course Objective	:	This course aims to impart to the student, knowledge of: Basic concepts of Photochemical reactions and chemistry of Heterocyclic compound. Classification of reactions with mechanism, determining reaction mechanism using suitable methods. Stereochemistry of organic compounds, isomerism, different projection formulae with nomenclature.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Understand reactions and stereochemistry of photochemical reaction of various organic compounds.
	CO2	Learn about different types of five membered and six membered heterocyclic compounds.
	CO3	Analyze General nature, method, mechanism and synthetic applications of Name reactions.
	CO4	Select specific reagent for specific organic synthesis.
	CO5	Learn C13 NMR and Mass spectroscopy.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
			C	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) Photochemistry:</p> <p>1. Photochemical reactions: Principles of energy transfer, electronic excitation and molecular orbital view of excitation, excited states and fate of excited molecules (modified Jablonski diagram), Photosensitization.</p> <p>2. Photochemistry of carbonyl compounds: Representation of excited states of ketones, photoreduction Norrish type I & II reactions, Reactions of cyclic Ketone, oxetane formation (Paterno-Buchi reaction) methane rearrangement, Dienone photochemistry, cis-trans isomerisation and π</p> <p>3. Di- photochemistry of conjugated olefins.</p> <p>(B) Chemistry of Heterocycles:</p> <p>1. Nomenclature of heterocycles: Replacement and systematic nomenclature (Hantzsch Widman system) for monocyclic, fused and bridged heterocycles. General chemical behavior of aromatic heterocycles.</p> <p>2. Five-membered heterocycles : Oxazole, Isoxazole, Thiazole, Pyrazole, Imidazole, Triazoles, Tetrazole.</p> <p>3. Six membered and benzofused six membered heterocycles: Pyrazine, Pyridazine, Pyrimidine, Cinnoline, Quinazoline, Quinoxaline.</p>	15	25%	CO1 CO2
2	<p>Name reactions:</p> <p>General nature, method, mechanism and synthetic applications of the following reactions:</p> <p>(i) Vilsmeier-Haack reaction (ii) Mitsunobu reaction (iii) Suzuki reaction (iv) Balz-Schiemann reaction (v) Sonogashira coupling (vi) Stobbe condensation (vii) Ullmann reduction (viii) Swern oxidation reaction (ix) Perkin reaction (x) Darzen's glycidic ester synthesis (xi) Mannich reaction (xii) Finkelstein reaction (xiii) Jones oxidation (xiv) Wittig reaction (xv) Knoevenagel reaction.</p>	15	25%	CO3
3	<p>Reagents in organic synthesis:</p> <p>Mechanism selectivity and utility of following reagents:</p> <p>(i) Gilman's reagent-Lithium dimethylcuprate (ii) Lithium diisopropylamide (LDA) (iii) Dicyclohexyl carbodiimide (DCC) (iv) 1,3 - Dithiane (Umpolung reagent) (v) Dess-Martin periodinane (vi) Baker's yeast (vii) Azo-bis-isobutyronitrile (viii) Oxaziridine (ix) Thionyl Chloride (x) DDQ (xi) Ter-butyl Hydro Peroxide (xii) Di-methyl dioxirane (xiii) Phase transfer catalysis: Quaternary</p>	15	25%	CO4

	ammonium and phosphonium salts.			
4	Spectroscopy: 1. C13 NMR: General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. 2. Mass spectroscopy: Introduction, ion production, EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak, McLafferty rearrangement. Nitrogen rule, High resolution mass spectroscopy. 3. Examples of mass spectral fragmentation of organic compounds, NMR, IR, UV with respect to their structure determination.	15	25%	CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	40	20	-	20	20	-

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://www.organic-chemistry.org/namedreactions/
2	https://archive.nptel.ac.in/content/storage2/courses/104103022/download/module10.pdf
3	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Basic_Principles_of_Organic_Chemistry_(Roberts_and_Caserio)/28%3A_Photochemistry/28.03%3A_Organic_Photochemistry

Reference Books

Sr. No.	Name of Reference Books
1	Introductory Photochemistry, A.Cox and T.Camp, McGraw Hill. 6) Photochemistry, R.P. Kundall and A. Gilbert, Thomson Nelson.
2	Organic Photochemistry, J. Coxon and B. Halton, 2nd Edition, Cambridge University Press.
3	Stategic Applications of Named Reactions in Organic Synthesis, Laszlo Kurti and Barbara Czak, 1st Edition, Academic Press.
4	Name Reactions and Reagents in Organic Synthesis, Bradford P. Mundy, Michael G. Ellerd, Frank G. Favaloro, 2nd Edition, Wiley - Interscience.
5	Name Reactions. A Collection of Detailed Reaction Mechanisms., Jie Jack Li, 3rd Edition

	Springer.
6	Heterocyclic Chemistry, volume 1-3, R.R. Gupta, M. Kumar and V. Gupta, Springer Verlag.
7	Heterocyclic Chemistry, J.A. Joule, K.Mills, and G.F. Smith, 3rd Edition, Chapman and Hall.
8	Heterocyclic Chemistry, T.L. Gilchrist, Longman Scientific Technical.
9	Contemporary Heterocyclic Chemistry, G.R. Nikome and W.W. Poudler, Wiley.
10	Comprehensive Heterocyclic Chemistry, A.R. Kartizky, and C.W. Rees.
11	Organic Chemistry, T.W. Graham Solomons and Graig B. Frymes, John Wiley and Sons.
12	Organic Chemistry, F. A. Carey, McGraw Hill Edition.
13	General Organic Chemistry Sachin Kumar Ghose, New Central book agency.
14	Encyclopedia of Reagents for Organic Synthesis, Leo A. Paquette, David Crich and Phillip L. Fuchs, John Wiley and Sons Inc.
15	Guidebook to Mechanism in Organic Chemistry by Peter Sykes, 6th Edition, Prentice Hall.
16	Advanced Organic Chemistry Part A: Structure and Mechanism and Part B:Reaction and synthesis ,Francis A. Carey, Richard J. Sundberg, 5th Edition, Springer .
17	Organic Chemistry Vol 1-2 I.L.Finar 5th edition,ELBS.
18	Modern Synthetic Reactions, H.O.House, W.A. Benjamin.
19	Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, 3rd Edition, Blackie Academic and Professional.
20	Spectrometric Identification of Organic Compounds by Robert M. Silverstein, 7th Edition , Wiley.
21	Mass Spectrometry - A Textbook Jurgen Gross, 1st Edition, 2002, Springer - Verlag Berlin Heidelberg.