INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**MASTER OF SCIENCE (CHEMISTRY)**
SEMESTER	**1**
COURSE TITLE	**ORGANIC CHEMISTRY-CONCEPTS AND FUNDAMENTALS**
COURSE CODE	**02CY0409**
COURSE CREDITS	**4**

Objective:

1 The main aim is to make students familiar with the basic concepts of reactive intermediates and the fundamental of organic chemistry which will be useful in their further studies.

2 Providing the knowledge and in depth understanding between the stereochemistry and conformation of organic molecules, their properties and behavior.

Course Outcomes: After completion of this course, student will be able to:

1 Generalize the basic concepts of organic chemistry, reaction intermediates and reaction pathways.

2 Basic Understanding of aromatic nucleophilic substitution reaction and its applications

3 Understand the importance of electrophilic substitution reaction and its applications

4 Predict the conformational preferences of common organic structures based on steric and electronic interactions and describe stereochemical and conformational structure on the chemical reactivity and on the mechanisms of organic reactions.

Pre-requisite of course: Before studying organic chemistry, all students have basic knowledge of organic and reaction mechanism, molecular structure, rearrangement, catalyst and knowledge related to UG level chemistry.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Reactive intermediates and reaction pathways** Homolytic bond fission, Heterolytic bond fission, Nucleophiles and electrophiles, Introduction, stability, generation, reactions and applications of carbcations, carbanions, free radicals, carbenes, nitrenes, benzynes, ylides and enamines.	12

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Contents : Unit	Topics	Contact Hours
2	**Aromatic Nucleophilic Substitution reactions** Nucleophilic substitution reactions, SN1, SN2, SNi and neighbouring group mechanisms, nucleophilic substitutions at allylic, aliphatic trigonal and vinyl carbons, effect of substrate, nucleophile, leaving group, and medium, stereochemistry of nucleophilic substitution, ambident nucleophiles, aromatic nucleophilic substitutions, SNAr, SN1, Sommelet-Hauser, Von Ritcher and Smiles rearrangement and Rosenmund reactions.	18
3	**Aromatic Electrophilic substitution reactions** Aromatic electrophilic substitution, mechanism and reactivity, selectivity and orientation, applications of the Hammett and Taft equations, the effect of leaving group, linear free energy relationships, nitration, diazonium coupling, sulphonation, chlorination, bromination, Friedel-Crafts alkylation, acylation and arylation, aliphatic substitution mechanisms, SE2, SEi and SE1, addition-elimination and cyclic mechanisms, hydrogen exchange, keto-enol tautomerism, halogenations of ketones, aldehydes and carboxylic acids, Stork enamines, carbene and nitrene insertions, Kolbe-Schmidt reaction.	18
4	**Stereochemistry** Stereochemistry: conformational analysis of acyclic and cyclic systems, enatiomers and diastereomers, prochiral faces, enantio and diastereotopicity, absolute and relative configuration, configuration descriptors R/S and E/Z notations, optical purity, enantio/diastereomeric excess., elements of symmetry, chirality, molecules with more than one chiral center, projection formulae (i) Fischer (ii) Sawhorse (iii) Newman (iv) Flying Wedge, threo and erythro isomers, methods of resolution, optical purity, enantiotopic and diastereotopic atoms, groups and faces, stereospecific and stereoselective reactions, optical activity in the absence of chiral carbon, CIP rule, Cram's rule	12
Total Hours		**60**

Textbook :

1 A Textbook of Organic Chemistry, Bahl Arun and Bahl B.S., S Chand & Company, 2016

2 Introduction to Stereochemistry, Kurt Mislow , Dover Publications Inc., 2003

3 A Textbook of Organic Chemistry , Mandeep Dalal, Dalal Institute, 2019

References:

1 March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure, March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure, Michael B. Smith, Wiley, 2015

2 Organic Chemistry, Organic Chemistry, FINAR , Pearson Education India, 2002

3 Named Organic Reactions, Named Organic Reactions, Andreas Plagens, Thomas Laue , Wiley, 2005

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References:

4 Stereochemistry Conformation and Mechanism, Stereochemistry Conformation and Mechanism, P.S. Kalsi , NEW AGE, 2009

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1 https://www.youtube.com/watch?v=tzpStGaLjSE

2 https://www.youtube.com/watch?v=IaplvqRJL1I

3 https://www.youtube.com/watch?v=d0p3Zx5gZSY

4 https://www.youtube.com/watch?v=BK09xpyA3vY

5 http://www.nptel.ac.in/courses/104103069/#

6 http://ocw.mit.edu/courses/chemistry/

7 http://vlab.amrita.edu/index.php?sub=2

8 https://www.youtube.com/watch?v=Bw_cetheReo

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