

Course Code	Course Name	Credits
26CH008	ORGANIC CHEMISTRY-I	04

Course Objectives

- To understand the basic concepts of Organic Chemistry.
- To study the nature of bonding in organic molecules.
- To learn about different reaction mechanisms.
- To understand the concept of stereochemistry.
- To gain knowledge of aromaticity.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Understand, analyze and recall the chemistry of nitrogen and carbonyl compounds, photochemistry, reaction mechanisms, stereochemistry, and biomolecules.
- Recall and explain concepts of nitrogen and carbonyl compounds, photochemistry, reaction mechanisms, stereochemistry, and biomolecules.
- Explain the significance and applications of nitrogen and carbonyl compounds, photochemistry, reaction mechanisms, stereochemistry, and aromaticity.

Unit 1 - Chemistry of Nitrogen Compounds (12 Hrs.)

Preparation of nitrobenzene; ortho-, meta-, and para-dinitrobenzene; TNT; reduction of aromatic nitro compounds in neutral, acidic, and alkaline media; relative basic character of aliphatic and aromatic amines; ring substitution in aromatic amines; diazotization and its mechanism; synthetic applications of diazonium salts; phenylenediamines; sulphanilic acid; sulphanilamide; saccharin; chloramine-T.

Unit 2 – Carbonyl Compounds and Photochemistry (12 Hrs.)

Carbonyl polarization; acidity of α -hydrogen; mechanisms of aldol, Perkin, Knoevenagel, benzoin, Cannizzaro, Claisen, Reformatsky, and Wittig reactions; mechanisms of reduction using NaBH_4 , LiAlH_4 , Wolff-Kishner, and MPV reactions; haloform reaction; Michael addition; Oppenauer oxidation; basics of photochemistry; photochemistry of carbonyl compounds; Norrish type I and type II reactions.

Unit 3 - Stereochemistry (12 Hrs.)

Stereoisomerism: definition and classification; optical isomerism; optical activity; specific rotation; criteria for optical activity; asymmetric centre; chirality and achirality; D, L and d, l notations; elements of symmetry; optical activity of lactic acid, tartaric acid, biphenyls, allenes, and spiranes; racemisation; racemisation by substitution; resolution methods including mechanical, conversion into diastereoisomers, and biochemical methods; asymmetric synthesis; partial and absolute asymmetric synthesis; Walden inversion; R and S notation of acyclic compounds with one or two asymmetric centres; erythro and threo representations.

Unit 4 – Stereoisomerism and Heterocyclic compounds (12 Hrs.)

Geometrical isomerism; cis-trans, syn-anti, and E-Z notations; geometrical isomerism in maleic and fumaric acids and unsymmetrical ketoximes; methods of distinguishing geometrical isomers including dipole moment, dehydration, heat of hydrogenation, cyclisation, and melting points; aromatic character of heterocyclic compounds; comparison of basicity of pyrrole, pyridine, and amines; preparation, properties, and uses of furan, pyrrole, thiophene, quinoline, isoquinoline, and indole; Skraup synthesis; Bischler-Napieralski synthesis.

Unit 5 - Aromaticity (12 Hrs.)

Concept of aromaticity; homoaromaticity; antiaromaticity; stability and carbon-carbon bond lengths of benzene; resonance structures; molecular orbital picture; Hückel rule; aromatic ions; aromatic electrophilic substitution; mechanism of nitration, halogenation, sulphonation, and Friedel-Crafts reactions; effect of substituent groups including activating and deactivating substituents.

Reference Books:

1. A. Bahl, B. S. Bhal, A Textbook of Organic chemistry, 22nd Ed., 2016. S. Chand and Company Ltd., New Delhi.
2. P. L. Soni, Text book of Organic Chemistry, 28th Ed., 2004. S. Chand and Company Ltd., New Delhi,
3. R. T. Morrison and R. N. Boyd., Organic Chemistry, 7th Ed., 2011. Prentice Hall of India Pvt. Ltd., New Delhi.
4. Carey, A. Francis, Sundberg, J. Richard, Advanced Organic Chemistry Part A: Structure and Mechanisms, 5th Ed., 2007 Springer, New York,

Websites and eLearning Sources:

1. <https://nptel.ac.in/courses/104105071>
2. Synthesis, Reactivity and Properties of Furan - Organic Chemistry PDF Download
3. <https://youtu.be/l3x5i0VEEAs?si=C-WSHSH2PP7N5xjl>

COs and Bloom's Taxonomy Mapping – 26CH008

Course Outcomes	On completing U.G. program the students will be able to	BTL
CO1	Recall and understand preparation, reactions, and properties of nitro compounds, aromatic amines, and diazonium salts.	K1, K2
CO2	Explain stereoisomerism and apply chirality, optical activity, and R/S notation to analyze stereochemical properties and reactions of organic compounds.	K3
CO3	Analyze geometrical isomerism, distinguish isomers using physical and chemical methods, and compare aromaticity, basicity, and reactivity of key heterocycles.	K4
CO4	Assess carbonyl reactivity, reaction mechanisms, and photochemical behavior, including Norrish type I and II reaction	K5
CO5	Design and predict electrophilic substitution in aromatic compounds using aromaticity, resonance, and substituent effects.	K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

Relationship Matrix – 26CH008

Course Outcomes	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)						Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	3	3	2	1	1	2	3	3	2	2	2	2	2.16
CO2	3	3	3	1	1	1	3	2	3	3	2	3	2.33
CO3	2	3	3	2	1	2	3	2	3	2	2	3	2.33
CO4	3	2	3	1	1	1	3	1	2	3	2	2	2.00
CO5	3	2	3	1	1	3	3	2	3	3	3	3	2.50
Total													2.26

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

