



बिरसा मुंडा द्रायबल युनिवर्सिटी

Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

B.Sc. (Chemistry) Programme

Subject Code & Name: - BS06MJCHE1 & Organic Chemistry-IV

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
4	-	-	4	50	-	50	-

Programme Name	B.Sc.
Semester	VI
Course Code	BS06MJCHE1
Course Title	Organic Chemistry-IV
Course Content Type (Th./Pr.)	Theory
Course Credit	4
Sessions+ Lab. Per Week	4
Total Teaching/Lab. Hours	60
* 2 Laboratory = 1 Session	

Learning Objectives

1. Understand the IUPAC and trivial naming systems for heterocyclic compounds, including 5- and 6-membered rings (e.g., Pyrrole, Furan, Thiophene, Pyridine, Piperidine).
2. Explain the resonance structures and aromatic character ($4n+2$ π electrons) of heteroaromatic systems.
3. Identify concerted reactions that proceed via a cyclic transition state and distinguish them from polar/radical reactions.
4. Differentiate between electrocyclic reactions, cycloaddition reactions (e.g., Diels-Alder), sigmatropic rearrangements, and group transfer reactions.
5. Understand the formation, structure, stability, and reactivity of intermediates such as carbocations, carbanions, free radicals, carbenes, and nitrenes.
6. Understand the physical basis of nuclear spin, the interaction of nuclei with external magnetic fields.

Prerequisites (if any)





बिरसा मुंडा ट्रायबल युनिवर्सिटी

Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

B.Sc. (Chemistry) Programme

Learning Outcomes

On the Completion of this course, students will able to:

1. Understand aromaticity, synthesis, and substitution reactivity (electrophilic vs. nucleophilic) in pyridine, pyrrole, furan, and thiophene.
2. Determine stereoselectivity (cis/trans) and regioselectivity in Diels-Alder and other reactions.
3. Study mechanisms for key reactions like Aldol, Michael, and Rearrangements (e.g., Beckmann, Pinacol).
4. Understand the principles of nuclear magnetic resonance ^{13}C carbon magnetic resonance, chemical shifts, splitting patterns (spin-spin coupling), and integration to determine structure.

Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	Heterocyclic compounds Introduction, heterocyclic nomenclature and synthesis, Reactivity and properties, Aromaticity of common heterocyclic compounds containing heteroatoms (N,O,S), Electrophilic and nucleophilic aromatic substitution reactions of pyrrole, furan and thiophene, source of pyridine.	15
II	Reaction mechanism Chemistry of reactive intermediate (carbocation, carbanion, free radical, Carbene, Nitrene, Benzyne), Nucleophilic substitution, elimination reaction and mechanism, Simmons- Smith reaction, Darzon reaction, Wittig reaction and Mac murray reaction, Mannich creation, Birch reduction, Perkin reaction. Molecular rearrangements Hoffman rearrangement, Curtius rearrangement, Pinacole Pinacolone rearrangement, semi-pinacolone rearrangement, benzylic acid rearrangement, Somlet rearrangement, Fries rearrangement, Favourski rearrangement.	15





बिरसा मुंडा ट्रायबल युनिवर्सिटी

Birsa Munda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

B.Sc. (Chemistry) Programme

III	Pericyclic reactions Introduction, Theory of pericyclic reactions, Bonding and antibonding orbitals, Electronic configurations of some molecules Orbital symmetry and the chemical reactions, Electrocyclic reactions, Cyclo addition reactions, Sigma tropic rearrangement	15
IV	Basic principles of spectroscopy NMR spectroscopy: The nuclear magnetic resonance spectrum, Number of signals. Equivalent and non-equivalent protons, Position of signals. Chemical Shift, peak area and proton counting, splitting of signals. Spin-spin coupling, Coupling constants Carbon-13 NMR (CMR) spectrometry: CMR. Splitting, NMR and CMR spectra of hydrocarbons, NMR and CMR spectra of alkyl halides	15

Text Book(s)

Reference Books

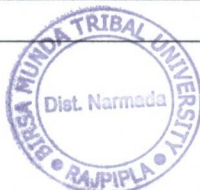
1. Organic Spectroscopy by J. B. Yadav, New Age International Publishers
2. Fundamentals of Analytical Chemistry by Skoog, West, Holler
3. Organic chemistry by Morrison Boyd and Bhattacharjee, VIIth Edition, Pearson Education Inc.
4. Organic reaction mechanism by V. K. Ahluwalia, Rakesh kumar Parashar, Narosa Publication House New Delhi
5. Heterocyclic Chemistry, 5th edition by John A. Joule and Keith Mills, Willey Publication
6. Organic reactions, Stereochemistry and mechanisms by P.S. Kalsi and R. S. Oza, New Age International Publication
7. Organic Chemistry vol. 2 Stereochemistry and the chemistry natural products, 5th edition by I.L. Finlay, Pearson Publication

Web Resources

1. Google books, INFLIBNET, Google Web

Required Software(s) (if any)

Practical(s) (if any)





बिरसा मुंडा द्रायबल युनिवर्सिटी Birsā Mūṇḁā Drāyabala Yūnīvārsīṭī

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

B.Sc. (Chemistry) Programme

L:: Lecture, **T::** Tutorial, **P::** Practical

CCE:: Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

PWE:: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE:: Semester End Evaluation