

ELECTIVE PAPER-C: HETEROCYCLIC CHEMISTRY

Semester	Subject Code	Category	Instruction Hours						Credits
			Lecture		Theory		Practical		
			Per Week	Per Semester	Per Week	Per Semester	Per Week	Per Semester	
II	21CPCH2Db	Elective	3	45	3	45	0	0	3

COURSE OBJECTIVES

- ❖ To study about the chemistry of heterocyclic compounds.
- ❖ To enhance the knowledge strategies for designing the chemical synthesis for higher heterocycles.

COURSE OUTCOME

- On completion of the course, the student should be able to:

CO Number	CO statement	Knowledge level
CO1	Gain knowledge about aromatic compounds and aromatic heterocyclic compounds.	K2 & K3
CO2	Get knowledge about strain, bond angle strain, torsional strain and their consequences in small ring heterocycles and conformations of six membered heterocycles.	K3 & K4
CO3	Understand about the three membered, four membered and five membered heterocyclics.	K3 & K4
CO4	Acquire knowledge about mesoionic heterocyclics.	K2 & K3
CO5	Gain knowledge about higher heterocyclic compounds	K3 & K4

* CO-Course Outcomes

Knowledge level K1-Remember; K2-Understand; K3-Apply; K4-Analyze

MAPPING WITH PROGRAM OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	S	M	M	M
CO2	M	S	M	S	S	M
CO3	M	S	S	S	S	M
CO4	M	S	S	M	S	M
CO5	M	M	M	S	S	S

UNIT I: NOMENCLATURE OF HETEROCYCLES**9 hours**

Introduction - nomenclature systems - systematic nomenclature system (Hantzsch – Widman system) and replacement nomenclature system for monocyclic, fused, spiro and bridged heterocycles - Aromatic heterocycles – Introduction - chemical behavior of aromatic heterocycles - classification (structural types) - Criteria of aromaticity in heterocycles (bond lengths, dipole moments, empirical resonance energy, delocalization energy, Dewar resonance energy, chemical shifts and ^1H NMR spectra).

UNIT- II: NONAROMATIC HETEROCYCLES**9 hours**

Introduction - strain, bond angle strain - torsional strain and their consequences in small ring heterocycles - conformations of six membered heterocycles – molecular geometry - barriers to ring inversion - pyramidal inversion and 1,3 - diaxial interactions. Stereoelectronic effect in saturated six membered heterocycles- anomeric effect - other related effects and attractive interactions through space.

UNIT III: SMALL RING HETEROCYCLES**9 hours**

Three membered and four membered heterocycles - Synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxetanes and thietanes - Benzo- fused five membered heterocycles: Synthesis and reactions including medicinal applications of benzopyrroles, benzofurans and benzothiophenes.

UNIT- IV: MESO - IONIC HETEROCYCLES**9 hours**

General classification - chemistry of some important meso-ionic heterocycles of type A and B and their applications - Six membered heterocycles with one heteroatom - Synthesis and reactions of pyrylium salts and pyrones and their comparisons with pyridinium and thiopyrylium salts and pyridines.

UNIT-V: HIGHER HETEROCYCLES**9 hours**

Six membered heterocycles with two or more heteroatoms Synthesis and reactions of diazines. triazines and tetrazines - Seven and large membered heterocycles - Synthesis and

reactions of azepines, oxepines, thiepinines and diazepines - Synthesis of five and six membered heterocycles with P, As, Sb and Bi.

Distribution of Marks: Theory-100%

TEXT BOOKS:

S.No	Authors	Title	Publishers	Year of publication
1.	Gupta, M. Kumar and V.Gupta	Heterocyclic Chemistry	Vol. 1 Springer Verlag -3, R. R	1998
2.	T. Eicher and S. Hauptmann, Thieme	The Chemistry of Heterocycles	First Edition,	2003
3.	J. A. Joule, K. Mills and G. F. Smith, Chapman and Hall	Heterocyclic Chemistry	London, New York : Chapman & Hall	1995
4.	T. L. Gilchrist	Heterocyclic Chemistry	Longman Scientific Technical	2017
5.	G. R. Newkome and W.W. Paudler	Contemporary Heterocyclic Chemistry	Wiley –inter Science.	1982

REFERENCES BOOKS:

S.No	Authors	Title	Publishers	Year of publication
1.	R. M. Acheson, John Wiley.	An Introduction to the Heterocyclic Compounds	Interscience Publishers	1960
2.	A. R. Katritzky and C.W. Rees, eds	Comprehensive Heterocyclic Chemistry	Pergamon press, Elsevier Science, Ltd	1996

TEACHING METHODOLOGY:

- Board and chalk
- PowerPoint presentation
- Models
- Group discussion
- Seminar and Assignments
- Animated videos

SYLLABUS DESIGNERS:

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