

CALICUT UNIVERSITY – FOUR-YEAR UNDER GRADUATE PROGRAMME (CU-FYUGP)

BSc CHEMISTRY

Programme	B. Sc. Chemistry						
Course Title	ORGANIC CHEMISTRY 1						
Type of Course	MAJOR /MINOR						
Semester	III						
Academic Level	200 - 299	200 - 299					
Course Details	Credit	Lecture	Tutorial	Practical	Total		
		per week	per week	per week	Hours		
	4	3	-	2	75		
Pre-requisites	Basics of organic chemistry-Functional groups, Homologous series, Nomenclature and isomerism						
Course Summary	This course explores basics of organic chemistry reaction mechanism, Reactions and mechanism of important functional groups and stereochemistry						

Course Outcomes (CO):

СО	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	To understand the basics of Organic chemistry	U	С	Test /Seminar
CO2	To understand the basic concepts of reaction mechanisms	U	р	Discussion/ Assignment
CO3	To recognize the various types of organic reactions and reaction intermediates	An	Р	Quizzes/Test
CO4	To realise the importance of stereoisomerism, optical activity and chirality	Ар	Р	Discussion/Seminar /Assignment
CO5	To enable the students to improvise Molecular models	Ар	Р	Assignment/Test

CO6	To empower students in various	Ap	Р	Lab work/Viva			
	separation and purification						
	techniques						
* - Ren	* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)						
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive							
Knowledge (M)							

Detailed Syllabus:

Module	Unit	Unit Content			
Ι		Introduction	12	26	
	1	IUPAC Nomenclature of multifunctional acyclic and cyclic compounds. Structural isomerism.	2		
	2	2			
	3	Localised and delocalised bonding. Hydrogen bonding, effect of hydrogen bonding on physical and chemical properties of compounds	1		
	4	Organic acids and bases	2		
	5	Basics of MO theory as applied to organic molecules -Ethylene and Buta-1,3-diene.	3		
	6	Aromaticity-Huckel's rule for aromaticity (Benzenoid compounds)	2		
II		Organic reaction mechanisms	12	26	
	7	Types of bond fission-Homolytic and Heterolytic fission	1		
	8	Arrow formalism used in reaction schemes.	1		
	9	Electrophiles and Nucleophiles	1		
	10	Electron displacement Effects: Inductive effect and Field effect, Steric effect- Acidity and basicity of organic compounds based on Field effect and steric effect.	2		
	11	Electromeric effect, Mesomeric effect	2		
	12	Hyperconjugation- Stability of alkenes.	1		
	13	Reactive intermediates: Structure, formation and stability of carbocations, carbanions, free radicals, carbenes and nitrenes.	3		
	14	Pericyclic reactions and its classifications	1		

III	Stereochemistry-I					
	15	3				
	16	6 Inter conversion of different projections of L-tartaric acid and 3- chloro-2-butanol.				
	17	Conformational Isomerism – Conformational analysis of Ethane, n- butane and cyclohexane with PE diagram.	3			
	18	Conformation of mono substituted cyclohexanes. Relative stability of conformations.	2			
	19	Configurational isomerism: Geometrical isomerism in alkenes, cycloalkanes and oximes. Cis-trans, Syn-Anti and E-Z notations, sequence rule.	3			
IV		Purification and Characterization Techniques	7	16		
	20	Distillation- Simple, fractional, steam and vacuum distillations	2			
	21	Recrystallisation, sublimation, solvent extraction.	2			
	22Chromatography, stationary phase, mobile phase, Rf values, - TLC, Column chromatography, HPLC and GC (basic concepts only).					
V		Practicals	30			
	1.	Introduction to organic lab	4			
	2	 Distillation of Aniline, Distillation of Limonene (from orange peels) Purification of organic compounds by crystallization using the following solvents: a. Water b. Alcohol Sublimation of a dicarboxylic acid/Naphthalene Molecular model construction and conformation of ethane Molecular model construction of Ethylene or Acetylene Molecular model construction of acetaldehyde and Cyclohexane. 	20			
	3	Open ended	6			

References

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

2. Bhal and Bhal, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

3. Kalsi, P. S., Stereochemistry Conformation and Mechanism; 8thEdn, New Age International, 2015

4. I. L. Finar, Organic Chemistry, Vol. I, 5th Edn., Pearson Education, New Delhi, 2013.

5. M. K. Jain, S. C. Sharma, *Modern Organic Chemistry*, 3rd Edn., Vishal Publishing Company Co., 2010.

6. K. S. Tewari, N. K. Vishnoi, S. N. Mehrotra, *A Textbook of Organic Chemistry*, 2nd Edn., Vikas Publishing House, New Delhi, 2004.

7. B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatchell, *Vogel's Textbook of Practical Organic Chemistry*, 5th Edn., Pearson Education, Noida, 2014.

8. F. G. Mann, B. C. Saunders, *Practical Organic Chemistry*, 4th Edn., Pearson Education, Noida, 2011.

9. Arthur I. Vogel, *Elementary Practical Organic Chemistry- Small Scale Preparations*, 2nd Edn., Pearson Education, Noida, 2013

10.An Improved Method for the Extraction and Thin-Layer W Chromatography of Chlorophyll a and b from Spinach Hao T. Quach, Robert L. Steeper, and G. William Griffin, J Chem Edn, 2004, 81, 385

11. Chemistry for Pharmacy Students: General, Organic and Natural Product Chemistry, S D Sarkar and L Nahar, John Wiley and sons, Ltd.

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1						3				1	1	1
CO 2	2						2				2		1
CO 3	3						2				2		1
CO 4				2	2		2				2		1
CO 5	2						2		1	1	1	1	1
CO 6			3			2	2		1		2	1	2

Mapping of COs with PSOs and POs :

Correlation Levels:

Level	Correlation
_	Nil
1	Slightly / Low
2	Moderate /
	Medium
3	Substantial /
	High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignm ent/viva/s eminar	Practical skill Evaluation	End Semester Examinations
CO 1	\checkmark	\checkmark		\checkmark
CO 2		\checkmark		\checkmark
CO 3	\checkmark			\checkmark
CO 4		\checkmark		\checkmark
CO 5	\checkmark	\checkmark		\checkmark
CO 6		\checkmark	\checkmark	\checkmark