

Branch Name:	M.Sc. Chemistry
Program Code:	SC203
Course Name:	Analytical Techniques-I
Course Code:	2SC2030104
Pre-requisite Course:	-

Course Objectives:

- Basic to advanced level knowledge of organic spectroscopy.
- To impart knowledge and training in chemistry at advanced level, make aware with recent analytical technique.
- Students can apply knowledge of mobile phase selection, stationary phases, detectors, and column chemistry to optimize chromatographic separations.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)					Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit		Theory(Marks)		Practical(Marks)		Total (Marks)
			T	P	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
4	-	-	4	-	50	50	-	-	100

Subject Contents:

Unit	Contents	Lecture	Weightage
1	IR Spectroscopy Introduction, principle of IR spectroscopy, Modes of vibration (AB ₂ Type molecule) instrumentation, sampling technique, selection rules. Characteristic vibrational frequencies of functional groups. Finger print region, Factors affecting vibrational frequencies. Hooke's law. Application of IR. Comparison with FTIR. Interpretation of organic molecules.	12	25%
2	Proton NMR Spectroscopy Introduction, principle of NMR spectroscopy, Equivalent & None equivalent Proton, Shielding & Deshielding, Chemical Shift & Molecular Structure Spin- Spin Splitting & Coupling constant Application of NMR. Interpretation of organic molecules.	12	25%
3	HPLC HPLC Principle, theory, instrumentation applications and advantages of high performance liquid chromatography (HPLC) ,Types of detectors, types of pump	12	25%
4	GC GC principle, theory, instrumentation applications and advantages, types of columns, packed columns, Capillary columns, Bonded phase columns, detector types and applications in pharmaceutical analysis.	12	25%

Text Books:

1. Instrumental methods of chemical analysis by B. K. Sharma, GOEL publishing house, Meerut, 2005.

Reference Books:

1. Spectroscopy of organic compounds by P.S.Kalsi
2. Analytical Chemistry by Gurdeep Chatwal(Author), HimalayaPublishingHouse (Contributor), Mahu Arora(Editor), 2019.
3. Analytical Chemistry” by GaryD.Christian, 7thEdition, Published 2013 by John Wiley and Sons Inc. New Jersey.

List of Open Source Software/learning website:

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=1+p0z2ZbAGSfsyfLITzgZQ==>
2. <https://archive.nptel.ac.in/courses/104/108/104108078/>

Course Learning Outcomes (CLO):On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Identify the vibrational frequencies of major functional groups, understand the factors and use these knowledge IR spectra of simple organic molecules.	2. Understanding 3. Applying
CLO2	Predict number of signals, splitting patterns in the proton NMR of a compound given its structure and use these knowledge NMR spectra of simple molecules.	2. Understanding 4. Analyzing
CLO3	To understand theory, instrumentation, applications and advantages of HPLC	2. Understanding
CLO4	Recall the basic terminology, components, and working principles of Gas Chromatography.	1. Remebering 2. Understanding
CLO5	Explain the fundamental principles of Gas Chromatography, including partitioning behaviour, retention mechanism, and factors affecting separation.	2. Understanding 3. Applying

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)																PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2
CLO1					1												1	2
CLO2						2											2	3
CLO3	1					1											2	3
CLO4	1				1	1				1							1	2
CLO5																	1	2

3:High, 2:Medium, 1:Low