

Branch Name:	M.Sc. Chemistry
Program Code:	SC203
Course Name:	Analytical Techniques-II
Course Code:	2SC2030204
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.
- In this module student will study the principles on which Separation techniques are based which is widely applied in industry, chemistry, biochemistry, environment science.
- To provide in-depth theoretical and practical understanding of electrochemical methods for qualitative and quantitative analysis

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	Electroanalytical techniques Electrolysis, Current-Voltage relation, Types of Electrogravimetric analysis (constant current, constant potential) Mercury cathode. Coulometric analysis, Various types of coulometers, Applications of coulometric titration Types of Coulometric Methods.	12	25%
2	AAS and AES Introduction, Principle, Flame Emission Spectroscopy (FES) and Atomic adsorption Spectroscopy (AAS), Principal, comparison and applications, Burners (Total consumption burner and Premix burners), inductively coupled plasma Emission Spectroscopy (ICPAES).Application of AAS.	12	25%
3	Carbon NMR Spectroscopy Introduction, Recording NMR Spectra, Multiplicity-noise decoupling, off resonance decoupling, Coupling in ¹³ C NMR, Chemical Shift, Chemical Shift Equivalence, Application of ¹³ C NMR.	12	25%

4	High Resolution NMR Spectroscopy Introduction to advance NMR techniques, Distortionless Enhancement of Polarization Transfer (DEPT), Proton NMR chemical shift for common functional groups, 2D NMR, Comparison of 1D & 2D NMR, NMR spectroscopy of N, F and P NMR spectroscopy, DBE, Numerical problem on UV, IR and NMR.	12	25%
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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), Himalaya Publishing House (Contributor), Mahu Arora(Editor), 2019.
3. Analytical Chemistry” by Gary D.Christian, 7th Edition, 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	To learn about Electrolysis, Current-Voltage relation and types Electro gravimetric analysis	1. Remembering 2. Understanding
CLO2	To understand and analyze Coulometric analysis, Various types of coulometers and Applications of coulometric titration.	2. Understanding 3. Applying 4. Analyzing
CLO3	To understand a brief knowledge of Atomic adsorption Spectroscopy and application of AAS and AES.	2. Understanding 3. Applying
CLO4	To gain a knowledge regarding different term such as Multiplicity-noise decoupling, off resonance decoupling, Coupling in ¹³ C NMR, Chemical Shift, Chemical Shift Equivalence in Carbon NMR spectroscopy.	2. Understanding
CLO5	To understand 1D, 2D and heteroatomic (N, F and P NMR) NMR spectroscopy.	1. Remembering 2. Understanding
CLO6	By using various concepts students can solve the Numerical problem on UV, IR and NMR spectroscopy.	3. Applying 4. Analyzing

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					2												1	3
CLO2	1					1											2	2
CLO3	1					2											1	3
CLO4	1																1	2
CLO5					1	2											2	2
CLO6	2	2			1	2											2	3

3:High, 2:Medium, 1:Low