Lecture Plan

Name of the college: Government College of Arts, Science and Commerce, Sanquelim- Goa

Name of Faculty: Ms. Varsha Sail	**Subject:** Chemistry	
Paper code: CHC-322	**Program:** T Y BSc	**Division:** A
Academic year: 2025 - 2026	**Semester:** VI	**Total Lectures: 30**

Course Objectives: :

1. Identify the principles of chromatographic techniques, X-ray diffraction, mass spectrometry, spectroscopic (AAS, flame photometry, fluorimetry), thermal methods (TGA, DTA, DSC) and Turbidimetry and Nephelometry
2. Explain the working principles of separation techniques (HETP), ionization methods (EI, ESI), thermal methods and spectroscopic and optical scattering methods for chemical analysis
3. Apply analytical principles to select appropriate techniques for separation or quantification and to solve numerical problems associated with analysis.
4. Interpret analytical data from the above techniques to deduce molecular and structural information about a sample.

Expected Course Outcome:

Students will learn the basic principle, instrumentation, working and application of analytical techniques like Chromatography, X-Ray differation, mass spectroscopy and thermal method

Student Learning Outcome: Students learn the basic principle, instrumentation, working and application of analytical techniques like Chromatography, X-Ray differation, mass spectroscopy and thermal method

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
December 2025	1st	6th	2	Chromatography - I Introduction, Classification of		Smart board, PPT, Quiz, Experiments	1. B. K. Sharma. Instrumental Methods of Chemical Analysis Goel Publishing House, Meerut. 2004 2. K. Raghuraman, D. V. Prabhu, C. S. Prabhu and P. A. Sathe, Basic principles in Analytical Chemistry, 1st edition, Shet Publications Pvt. Ltd , Mumbai, 2016 3. G. Chatwal and S. Anand, Instrumental Methods of Chemical Analysis, 5th edition Himalaya publication. India, 2003 4. H.Willard, L. Meritt and J.A. Dean, Settle Instrumental Methods of Analysis, 7th edition, CBS publication, India , 2004 5. D.A. Skoog and J.J. Leary, Principles of Instrumental analysis, 4th Edition, Saunders College Publication. Forth Worth1992 6. G. D. Christian, Analytical Chemistry, 6th edition, Wiley publication, NewYork, 2004
	8th	13th		Principle, Height Equivalent to a Theoretical Plate (HETP), van Deemter equation., experimental details,			
	15th	20th		chromatographic techniques: A) Column chromatography: theory of development, factors affecting column efficiency and applications	Observe Seperation of pigments on chalk column		
Jan 26	5th	10th		B) Paper and thin layer chromatography: Principle, techniques and applications of paper and thin layer chromatography	Separate sketchpen/marker colour on tissue paper		

	12th	17th		ISA C) Ion exchange chromatography: Principle, classification of ion exchange materials,			
	19th	24th		nature of exchanging ions, ion exchange capacity, applications in analytical chemistry.	Collect information about column in waterpurifier		
	27th	31st		Mass spectrometry - Introduction, basic principle, Instrumentation, Ionisation methods : Electron ionization (EI),			
Feb 26	2nd	7th		Chemical ionization (CI), Electrospray ionization (ESI), Matrix-assisted laser desorption ionization (MALDI)...			
	9th	14th		Analysers : Schematic diagram of single focussing, double focusing, quadrupole mass analyser and Time of-Flight mass analysers			
	16th	21st		Advantages of Quadrupole Mass Spectrometer, spectrum resolution. Interpretation of mass spectra: Nitrogen rule, ring plus double bond rule, even electron rule, rule of 13			

	23rd	28th		Applications of mass spectrometry in identification of pure compounds, analysis of mixtures, quantitative determinations	Interpret the MS spectrum		
March 26	2nd	7th		Thermal Analysis Principle, instrumentation			
	9th	14th		ISA Application of thermogravimetric analysis (TGA),			
	16th	21st		differential thermal analysis (DTA) and differential scanning calorimetry (DSC). Numericals based on TGA.			
	23rd	28th		X-ray diffraction methods Introduction to X-rays, X-ray diffraction of crystals,			

	30th	4th		Bragg's law, Single Crystal and Powder X-ray diffraction:			
	9th	14th		Instrumentation and applications.			
	16th	21st		Interpretation of powder X-ray diffraction pattern			
	23rd	28th		Revision			
	30th	4th		Revision			

Assessment Rubrics

Component	Max Marks
ISA 1	7.5
ISA 2	7.5
ISA 3	7.5
Project	-
Semester End Exam	60