

Lecture Plan		
Name of the college: Government College of Arts, Science and Commerce, Sanquelim- Goa		
Name of Faculty: Dr. Sagar Narayan Patil	Subject: Analytical Chemistry	
Paper code: CHD-103 ;Basic Topics in Analytical Chemistry	Program: TYBSc	Division: -
Academic year: Dec 2024- 2025	Semester: VI	Total Lectures: 30
Course Objectives: <ul style="list-style-type: none">• To classify different types of chromatographic methods.• To study the principles of GC, HPLC,• To interpret steps involved in chemical analysis.• To describe the basic components of instruments.• To draw the schematic diagrams of different instruments.• To solve numerical on chromatographic techniques• To discuss the applications of different chromatographic techniques and spectroscopic methods.		
Student Learning Outcome: <p>At the end of the course students will be able to</p> <ul style="list-style-type: none">• Discuss the principles behind the basic components of instruments (signal generators processors and detectors) and their advantages interfaced with computers.• Define the terms, and principles involved in involved gas chromatography (GC) liquid chromatography (HPLC).GC-MS, LC-MS and solve the numericals with reference to the techniques.• Explain sampling and working of X ray absorption and emission techniques.• Describe the working and principles in photoelectric colorimeters and spectrophotometers and its application in isomerism photometric titrations and chemical kinetics.		

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
December	09/12/2024	31/12/2024	2	<p>Introduction</p> <p>Overview of instruments in chemical analysis, Basic components of instruments for analysis: Signal generators, detectors (input transducers)</p>	Structures and problems	PPT/ Smart Board	<p>1. B. K. Sharma. Instrumental Methods of Chemical Analysis: Goel Publishing House, Meerut.</p> <p>2. K. Raghuraman, D. V. Prabhu, C. S. Prabhu and P. A. Sathe, Basic principles in Analytical Chemistry, 5th edition, Shet Publications Pvt. Ltd.</p>
January	03/01/2025	31/01/2025	7	<p>Signal processors, read out devices, circuits & electrical devices in the instruments, advantages of instruments interfaced with computers.</p> <p>Chromatographic techniques</p> <p>Classification of chromatography methods. Gas chromatography: Basic principles of GSC and GLC. Terms involved: Distribution equilibria, rate of travel, retention time.</p>	<p>ISA-I preparation</p> <p>Assignment</p>	Smart Board	<p>3. G. Chatwal and S. Anand, Instrumental Methods of Chemical Analysis 5th edition (reprint 2003), Himalaya publication.</p> <p>4. Vogels Textbook of Quantitative Inorganic Analysis 4th edition ELBS.</p>
February	01/02/2025	28/02/2025	8	<p>retention volume, relative retention, Height Equivalent to a Theoretical Plate(HETP), Van Deemter equation. Instrumentation: carrier gas, column, injections systems, explanations of factors affecting separation, thermal conductivity and flame ionization detectors.</p> <p>Qualitative and Quantitative analysis: internal standards, determination of peak area. HPLC: Instrumentation, description of pumps, detector choice (UV absorption and refractive index detectors), columns,</p>	<p>ISA-II preparation</p> <p>Test</p>	Smart Board	Listed as above

				injection system, packing materials, applications. Introduction to hyphenated techniques: Basic principles of GC-MS and LC-MS. (Numerical problems are to be solved)			
March	01/03/2025	31/03/2025		Mass spectrometry Introduction, theory, making the gaseous molecule into an ion (electron impact, chemical ionization), making liquids and solids into ions (electro spray, electrical discharge), separation of ions on basis of mass to charge ratio. Instrumentation: schematic diagram of single and double focusing. Advantages of Quadrupole Mass Spectrometer, sample introduction, sample purity, spectrum resolution. Applications of mass spectrometry in structure elucidation. Peak matching. X-ray diffraction methods Introduction to X-ray absorption and emission methods, Bragg's law,			Listed as above
April	01/04/2025	11/04/2025	9	3 Diffraction of X-rays, production and detection of X-rays, sample preparation, identification of powder diffraction patterns of ZnO, NiO and MgAl ₂ O ₄ .	revisions problems therein Paper solving	Smart Board	2. G. Chatwal and S. Anand, Instrumental Methods of Chemical Analysis 5th edition (reprint 2003), Himalaya publication. 3. Vogels Textbook of Quantitative Inorganic Analysis 4th edition ELBS.