Lecture Plan

Name of the college: Government College of Arts, Science & Commerce, Sanquelim, Goa		
Name of Faculty: Dr. Dipesh Sakharam Harmalkar	**Subject: Basic Topics in Analytical Chemistry**	
Paper code: CHD-101	**Program/Course: T.Y.BSc.**	**Division:**
Academic year: 2024 - 2025	**Semester: V**	**Total Lectures: 15**
Credits: 3		

Course Objectives:

- To define the terms involved in solvent extractions, chromatographic techniques, and electroanalytical methods.
- To explain scope and importance of solvent extractions, chromatographic techniques, and electroanalytical methods.
- To describe the basic components and to draw the schematic diagrams of different electroanalytical methods.
- To solve numerical of evaluation of data and solvent extractions.
- To discuss the applications of solvent extractions, chromatographic techniques, and electroanalytical methods.

Expected Course Outcome:

At the end of the course students will be able:

CO1: to explain the terms, laws and principle involved in solvent extractions, chromatographic techniques, and electroanalytical methods.

CO2: to solve numerical based on solvent extraction.

CO3: to describe the basic components of instruments of chromatographic techniques and electroanalytical methods.

CO4: to explain the applications of solvent extractions, chromatographic techniques, and electroanalytical methods.

Learning Outcome:

At the end of the course students will be able:

LO1: to understand and explain the key terms, fundamental laws, and principles underlying solvent extraction, chromatographic techniques, and electroanalytical methods.

LO2: to apply their knowledge of solvent extraction to solve numerical problems, demonstrating their analytical skills in this area.

LO3: to identify and describe the essential components of instruments used in chromatographic techniques and electroanalytical methods, gaining a deeper understanding of their operation and functionality.

LO4: to evaluate and explain the practical applications of solvent extraction, chromatographic techniques, and electroanalytical methods.

Month	Lectures From	Lectures To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise /Assignment	ICT Tools	Reference books
June	28-06-2024	30-06-2024	00				
July	01-07-2024	31-07-2024	04	**5. Solvent extraction:** Basic Principle, percentage extraction, role of complexing agents in solvent extraction, separation factor, types of extraction (continuous, batch).		Smart board, Power point presentation, Google classroom	[1-3]
August	01-08-2024	31-08-2024	05	**6. Chromatography**: Principles Classification of chromatographic techniques 1. Column chromatography: Principle, experimental details, theory of development, factors affecting column efficiency and applications. 2. Paper and thin layer chromatography: Principles, techniques and applications of paper and thin layer chromatography.	ISA II	Smart board, Power point presentation, Google classroom	[1-3]
September	01-09-2024	19-09-2024	02	**6. Chromatography**: 1. Column chromatography3. Ion exchange chromatography: Principles, classification of ion exchange materials.		Smart board, Power point presentation, Google classroom	[1-3]
September	20-09-2024	30-09-2024	01	**7. Electroanalytical methods:** Polarography: Introduction.		Smart board, Power point presentation, Google classroom	[1-3]

October	01-10-2024	22-10-2024	03	**7. Electroanalytical methods:** Polarography: Introduction, Basic principles of instrumentation, Deposition potential, Dissolution potential, Polarization of electrode, Polarographic wave, Ilkovic equation, Supporting electrolytes, Interference of oxygen, Applications of polarography – inorganic and organic.	Quiz	Smart board, Power point presentation, Google classroom	[1-3]

References:

[1] K. Raghuraman, D. V. Prabhu, C. S. Prabhu and P. A. Sathe, 5th Edn., Sheth Publishers Pvt. Ltd.

[2] G. D. Christan Analytical Chemistry by, 5th edition Wiley publications

[3] https://dishtavo.dhe.goa.gov.in/course_details_tab.php

Practical Plan

Name of the college: Government College of Arts, Science & Commerce, Sanquelim, Goa		
Name of Faculty: Dr. Dipesh Sakharam Harmalkar	**Subject: Basic Topics in Analytical Chemistry**	
Paper code: CHD 101	**Program: T.Y.BSc.**	**Division:**
Academic year: 2024 - 2025	**Semester: V**	**Total Practical/Labs: 8 (30 h)**
Credits: 1		

Course Objectives:

- To understand and develop the problem-solving skills and hands on experience with reference to concepts studied in theory (ion exchange chromatography, colorimetry, statistical data).

Expected Course Outcome:

At the end of the course students will be able:
CO1: to handle instruments for analytical purpose.
CO2: to estimate ions using colorimetry, volumetric titration, and ion exchange chromatography.
CO3: to perform thin layer chromatography.
CO4: to analyze and interpret data obtained from experimental results.

Student Learning Outcome:

At the end of the course students will be able:
LO1: to handle and operate analytical instruments with precision and accuracy.
LO2: to apply techniques such as colorimetry, volumetric titration, and ion exchange chromatography to estimate ion concentrations, ensuring accurate and reliable results.
LO3: to conduct thin layer chromatography (TLC) effectively, demonstrating the ability to separate and identify different compounds.
LO4: to analyze and interpret experimental data, using critical thinking and appropriate methodologies.

Month	Practical/Labs Scheduled Date	No. of Practical /Labs planned	List of Experiments	Reference books
June	---	---	Practical not started	
July	03-07-2024	1 (Batch II)	Determination of iron by salicylic acid by colorimetry.	[1,2]
	10-07-2024	1 (Batch II)	Determination of iron by salicylic acid by colorimetry.	[1,2]
	17-07-2024	1 (Batch II)	Determination of nitrite in water by colorimetry.	[1,2]
	24-07-2024	1 (Batch II)	Determination of nitrite in water by colorimetry.	[1,2]
	31-07-2024	1 (Batch II)	Determination of metal to ligand ratio by mole ratio method.	[1,2]
August	07-08-2024	1 (Batch II)	Determination of metal to ligand ratio by mole ratio method.	[1,2]
	14-08-2024	1 (Batch II)	Estimation of Na+ in NaCl by cation exchange resin using standard NaOH.	[1,2]
	21-08-2024	1 (Batch II)	Estimation of Na+ in NaCl by cation exchange resin using standard NaOH.	[1,2]
	28-08-2024	1 (Batch II)	Zn2+ /Mg2+ separation by an anion exchanger & volumetric estimation of Zinc with standard EDTA	[1,2]
September	04-09-2024	1 (Batch II)	Zn2+ /Mg2+ separation by an anion exchanger & volumetric estimation of Zinc with standard EDTA	[1,2]
	11-09-2024	1 (Batch II)	Estimation of Ca in calcium tablet by oxalate method and titration with KMnO4	[1,2]
	25-09-2024	1 (Batch II)	Estimation of Ca in calcium tablet by oxalate method and titration with KMnO4	[1,2]
October	02-10-2024	1 (Batch II)	Determination of hardness of water by EDTA i.e. estimate Ca as CaCO3 and report analysis in ppm.	[1,2]
	09-10-2024	1 (Batch II)	Determination of hardness of water by EDTA i.e. estimate Ca as CaCO3 and report analysis in ppm.	[1,2]
	18-10-2024	1 (Batch II)	Revision	[1,2]

References:

[1] Vogels Textbook of Quantitative Inorganic Analysis 4th edition ELBS.

[2] Mendham, J. Vogel's Quantitative Chemical Analysis (6th Edition) Pearson.

*** Assessment Rubrics**	
Component	**Max Marks**
ISA 1	8
ISA 2	7
Practical	25
Semester End Exam	60