Lecture Plan

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

Name of Faculty: Ankita M. Vernekar	**Subject:** Chemistry

Paper code: CHC-221 (Basics of chemical laboratory management)	**Program: S.Y.B.Sc.**	**Division:--**

Academic year: 2025 - 2026	**Semester:** IV	**Total Lectures:15**

Course Objectives: To develop students' proficiency in understanding, using, and maintaining laboratory balances, glassware, joints, a electrochemical cells and electrodes

Expected Course Outcome:

1. **Identify and explain the construction, care, and operation of analytical and non-analytical balances**, including weighing errors, reference masses, and proper weighing techniques.
2. **Classify and describe graduated laboratory glassware** such as pipettes, burettes, measuring cylinders, flasks, and wash bottles, and explain their calibration, units, and temperature standards.
3. **Recognize and handle general laboratory apparatus and ground-glass joints**, including desiccators, filtration setups, heating devices, weighing bottles, organic preparative apparatus, and techniques such as cutting/bending glass tubes and maintaining joints and stopcocks.
4. **Explain the construction, working, and maintenance of laboratory electrochemical cells and electrodes**, including conductivity cells, reference electrodes (SCE, hydrogen electrode), and working electrodes (Pt, Ag, Cu, Zn)

Student Learning Outcome:

1. **Identify and explain the construction, care, and operation of analytical and non-analytical balances**, including weighing errors, reference masses, and proper weighing techniques.
2. **Classify and describe graduated laboratory glassware** such as pipettes, burettes, measuring cylinders, flasks, and wash bottles, and explain their calibration, units, and temperature standards.

3. **Recognize and handle general laboratory apparatus and ground-glass joints**, including desiccators, filtration setups, heating devices, weighing bottles, organic preparative apparatus, and techniques such as cutting/bending glass tubes and maintaining joints and stopcocks.
4. **Explain the construction, working, and maintenance of laboratory electrochemical cells and electrodes**, including conductivity cells, reference electrodes (SCE, hydrogen electrode), and working electrodes (Pt, Ag, Cu, Zn)

Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
01/12/2025	06/12/2025	1	**Construction, working and maintenance of cells and electrodes** Conductivity cell, Reference electrode, Saturated Calomel electrode,	Give maintainance of electrode	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
08/12/2025	13/12/2025	1	hydrogen electrode, silver electrode, working electrode-platinum electrode	Give maintainance of electrode	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
15/12/2025	20/12/2025	1	copper electrode, zinc electrode.	Give maintainance of electrode	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
22/12/2025	23/12/2025	1	**Common Apparatus and glassware** Balances: The analytical balance, non-analytical balance,	Explain types of balances	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
24/12/2025	01/01/2026					
02/01/2026	10/01/2026	1	weight and reference masses, Care and uses of analytical balances, errors in weighing,	Errors in balances	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
12/01/2026	17/01/2026	1	Graduated glassware-units of volume, Graduated apparatus, Temperature standards, graduated flask,	Types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989

19/01/2026	24/01/2026	1	pipettes, Burettes, weight burettes, Piston burettes, Graduated (measuring) cylinders.		Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
26/01/2026	31/01/2026	1	Water for laboratory use- purified water, wash bottles	Explain use of water bottles	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
02/02/2026	07/02/2026	1	General apparatus- glassware, ceramics, plastic ware, heating apparatus,	Discuss different types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
09/02/2026	14/02/2026	1	Desiccators and dry boxes,.	Discuss different types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
16/02/2026	21/02/2026	1	Stirring apparatus, filtration apparatus, weighing bottles	Discuss different types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
23/02/2026	28/02/2026	1	Types of ground joints, care	Discuss different types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
02/03/2026	07/03/2026	1	maintenance of ground glass joints,	Discuss different types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
09/03/2026	14/03/2026	1	ISA 3, Apparatus for preparative organic chemistry,		Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989

16/03/2026	21/03/2026	1	other types of interchangeable joints and stopcocks,	Discuss different types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
23/03/2026	28/03/2026	1	Use of cocks and rubber stopper cutting and bending of glass tubing.	Discuss different types of apparatus	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
30/03/2026	31/03/2026	1	REVISION	-	Power point presentation/ Smart board	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989

Practical Plan

Name of the college: Government college of Arts Science and commerce Sanquelim Goa.

Name of Faculty: Ms. Ankita M. Vernekar	**Subject:** Chemistry	
Paper code: CHC-211(Basics of chemical laboratory management)	**Program: S.Y.B.Sc**	**Division: A**
Academic year: 2025- 2026	**Semester: IV**	**Total Practicals/Labs: 15HOURS (6 PRACTICAL)**

Credits: 1

Course ObjectivesTo train students in fundamental laboratory skills involving glassware identification, solution preparation, electrode classification, and laboratory safety practices.

Expected Course Outcome:

1) Identify and classify laboratory glassware and condensers, and explain their construction, assembly, and applications with the help of labeled diagrams.
2) Prepare, standardize, and dilute chemical solutions accurately, including normal, molar, and ppm concentrations, and perform basic quantitative calculations such as mole fraction.

3) Identify and classify reference and working electrodes, and describe their structure and functional use in electrochemical experiments.
4) Interpret chemical labels, hazard symbols, and fire classifications, and explain appropriate laboratory safety measures, including the use of different types of fire extinguishers**.**

Student Learning Outcome:

1) Identify and classify laboratory glassware and condensers, and explain their construction, assembly, and applications with the help of labeled diagrams.
2) Prepare, standardize, and dilute chemical solutions accurately, including normal, molar, and ppm concentrations, and perform basic quantitative calculations such as mole fraction.
3) Identify and classify reference and working electrodes, and describe their structure and functional use in electrochemical experiments.
4) Interpret chemical labels, hazard symbols, and fire classifications, and explain appropriate laboratory safety measures, including the use of different types of fire extinguishers**.**

Month	**Practicals/Labs Scheduled Date**	**No. of Practical's/Labs planned**	**List of Experiments**	**Reference books**
December	01/12/2025-06/12/2025	1	To identify and classify different types of flasks and funnels (Minimum four different types of each.)	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
December	08/12/2025-13/12/2025		-	
December	15/12/2025-20/12/2025	1	To identify and classify different types of pipettes and burettes (Minimum two different types of each.)	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
December	22/12/2025-23/12/2025			
January	24/12/2025-01/01/2026		**CHRISTMAS BREAK**	
January	02/01/2026-10/01/2026	1	Prepare 100 ml of 0.5 N NaOH solution and standardize using 0.5N KHP. Dilute and prepare 100 ml of 0.3N NaOH and standardize to determine correctness of dilution.	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
January	12/01/2026-17/01/2026		-	

January	19/01/2026-24/01/2026	1	Dilute the given standard solution of 0.05 M oxalic acid to 0.02N, 0.025N, 0.03N.	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
January	26/01/2026-31/01/2026			
February	02/02/2026-07/02/2026	1	Preparation and dilution of 100 ppm Fe solution using any salt of iron and to dilute to 80 ppm and 50 ppm.	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
February	09/02/2026-14/02/2026			
February	16/02/2026-21/02/2026	1	To identify and classify different types of Reference electrodes (any two)	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
February	23/02/2026-28/02/2026			
March	02/03/2026-07/03/2026	1	To identify and classify different types of Working electrode (any Two)	G.H. Jeffery, J. Bassett, J. Mendham, R. C. Denny.Vogel's Textbook of Quantitative Chemical Analysis, 5th edition, Longman Scientific and Technicals , England.1989
March	09/03/2026-14/03/2026	1	Revision	
March	16/03/2026-21/03/2026	1	Repetition	
March	23/03/2026-28/03/2026	1	EXAM	

Assessment Rubrics

Component	Max Marks
ISA 1	7.5
ISA 2	-
Practical	25
Project	-
Semester End Exam	15