

SUBJECT CODE: 1SC2030104	TITLE OF PAPER: ANALYTICAL CHEMISTRY
COURSE TYPE: CORE COURSE	

Course Objective: To impart knowledge and training in chemistry at advanced level, make aware with recent analytical technique, use of reagents and reactions in laboratory, synthesis and study of materials, the exploration of their properties and development of ways to use them in real life.

Teaching scheme (hours) per week		Credit			Theory Marks		Practical Marks		Total
Theory	Practical	Theory	Practical	Total	Uni. Assessment	Cont. Assessment	Uni. Assessment	Cont. Assessment	
4	2	4	2	6	60	40	30	20	150

UNIT	CONTENT	WEIGHTAGE	Hrs.
I	Analytical Objectives, Data Handling and Good Laboratory Practice (GLP) Scope of analytical science and its literature, qualitative and quantitative analysis, ways to express accuracy and precision, types of errors and their causes; significant figures, control charts, confidence limit, test of significance, rejection of a result- the Q-test. GLP- standard operating procedures, quality assurance and quality control, validation of analytical methods.	25%	12
II	Sampling and Calibration Methods Sampling and sample preparation, general steps in chemical analysis, calibration of glass wares. Finding the best straight line-least square regression, correlation coefficient; Calibration curves, standard addition technique and internal standards. Chemical concentrations.	25%	12
III	Volumetric Method of Analysis Primary and Secondary standards, Principles of volumetric analysis, Acid–base titration. Titration in non-aqueous solvents, Complex metric titrations, Precipitation titrations (Mohr’s titration, Volhard’s titration, adsorption indicators, Fajan’s titration), Redox titrations, Theoretical aspects of titration curves and end point evaluation, Choice and suitability of indicator in each case.	25%	12
IV	Sample Preparation Techniques Liquid-liquid extraction/solvent extraction-partition	25%	12

	coefficient, distribution ratio and percent extraction. Solvent extraction of metal ions-ion association complexes and metal chelates, multiple batch extraction, Craig's counter-current distribution. Accelerated and Microwave assisted extraction, protein precipitation and solid phase extraction (SPE).		
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Learning Outcome

- ❖ To provide the basic knowledge of very important concepts of the analytical chemistry (Sampling and Calibration Methods, Volumetric Method of Analysis, Gravimetric Analysis). To provide overview of the applications of these concepts in applied field to the student so as an objective.
- ❖ Students can learn the basic analytical and technical skills to work effectively in the various fields of chemistry
- ❖ To know and understand the issues of safety regulations in the use of chemicals in their laboratory work.

Practicals **M.Sc. Semester I**

Analytical Chemistry (any 6)

1. Water Analysis for TDS.
2. Water Analysis for Ca and Mg.
3. Water Analysis for carbonate and bicarbonate.
4. Water Analysis for Chloride.
5. Water Analysis for Sulphate.
6. Water Analysis for Total hardness.
7. Water Analysis for Nitrate.

LIST OF BOOKS:

1. Quantitative Chemical Analysis" by Daniel C. Harris, 5th Edition, W.H. Freeman and Company, New York.
2. Analytical Chemistry" by Gary D. Christian, 6th Edition, John Wiley and Sons Inc. New Jersey.
3. Principles of Instrumental Analysis" by Douglas A. Skoog, 3rd Edition, Holt-Saunders International Edition.
4. Instrumental Methods of Chemical Analysis" by Galen W. Ewing, 4th Edition, International Student Edition
5. Handbook of instrumental techniques for analytical chemistry, F. Settle, Prentice Hall
6. Spectroscopy of organic compounds by Silverstein
7. Spectroscopy of organic compounds by P.S. Kalsi