

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction

Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - III	Session: 2024-2025
1	Course Code	CHSE-01T	
2	Course Title		
3	Course Type	BASIC ANALYTICAL CHEMISTRY	
4	Pre-requisite(if,any)	DSE	
5	Course Learning Outcomes(CLO)	<p><i>As per Program</i></p> <ul style="list-style-type: none"> ➤ To understand the sampling, procedure and treatment of sample. ➤ To understand the analytical techniques for analysis in different types of chemical reactions. ➤ To understand the volumetric analysis technique. ➤ To understand the gravimetric analysis technique. 	
6	Credit Value	3 Credits	<i>Credit = 15 Hours -learning & Observation</i>
7	Total Marks	Max.Marks: 100	Min Passing Marks:40

PART -B: Content of the Course

Total No. of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)

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Unit	Topics(Course contents)	No. of Period
I	Qualitative and quantitative aspects of analysis Classification of analytical Techniques, Qualitative and quantitative analysis. Classical and instrumental methods. Factors affecting choice of analytical method. Errors in chemical analysis. Types of errors: Systematic and random, Absolute and relative, Additive and proportional. Normal distribution of indeterminate errors. Statistical parameters for data evaluation: Mean, median, average deviation, standard deviation, coefficient of variation, relative standard deviation. Accuracy and precision of results. Comparison of data using F and t-test, rejection of data using Q test. Numerical problems.	12
II	Sampling and sample treatment Criteria for representative sample. Bulk, gross, incremental and analysis sample. Sampling statistics. Techniques of sampling of ambient air, water and soil samples. Methods of sample size reduction: Coning and quartering, rolling and quartering. Hazards in sampling. Sample dissolution methods for elemental analysis: Dry and wet ashing, acid digestion, fusion processes and dissolution of organic samples. Types of analysis: Macro, semi-micro, micro, sub-micro and ultramicro. Major, minor and trace constituents of a sample.	11
III	Volumetric analysis General principle. Criteria for reactions used in titrimetric analysis. Primary standards and secondary standards. Concepts of equivalent weight and molecular weight, normality, molarity and various methods of expressing concentrations. Internal and external indicators. Theories of indicators in acid-base, precipitation, redox and complexometric titrations. Calculations involving preparation of standard solutions. Stoichiometric calculations in various types of titrations.	11
IV	Gravimetric analysis General principles and conditions of precipitation. Concepts of solubility, solubility product and precipitation equilibrium. Numerical problems based on solubility and solubility product. Purity of precipitate: Co-precipitation and post-precipitation. Super saturation and peptization. Criteria of selection of wash liquids. Steps involved in gravimetric analysis of barium as barium sulphate.	11

Keywords

Qualitative and quantitative analysis; errors; Accuracy; Sampling; titrimetric analysis; indicators; Gravimetric analysis

Signature of Convener & Members (CBoS):

PART-C:Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Pandey, O. P., Bajpai, D. N., Giri, S., Shrivastava, B. B. L., & Mishra, A. (2010). *Practical chemistry (1st ed.)*. S. Chand & Company.
2. Shrivastava, B. B. L., & Mishra, A. ([Year]). *Fundamentals of analytical chemistry*.

Reference books Recommended:

1. Harris, D. C. (2000). *Quantitative chemical analysis* W. H. Freeman and Company.
2. Mikes, O., & Chalmers, R. A. (2007). *Laboratory handbook of chromatographic methods* Elsevier.
3. Christian, G. D., Dasgupta, P. K., & Snyder, S. (2001). *Concepts of instrumental analysis*, Oxford University Press.

Online Resources:

- <https://edu.rsc.org/resources/analysis>
- <https://guides.loc.gov/chemistry-resources/print-materials/analytical>
- <https://www.classcentral.com/course/swayam-analytical-techniques-13896>
- <https://www.technic.com/analytical-controls/capabilities/volumetric-analysis>
- [https://chem.libretexts.org/Ancillary Materials/Laboratory Experiments/Wet Lab Experiments/General Chemistry Labs/Online Chemistry Lab Manual/Chem 11 Experiments/07%3A Gravimetric Analysis \(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_Experiments/07%3A_Gravimetric_Analysis_(Experiment))

PART-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment/Seminar- 10 Total Marks -30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit- 4x10=40 Marks	

Name and Signature of Convener & Members of CBoS: