Name of Faculty	:	Faculty of Science
Name of Program	:	Master of Science
Course Code	:	1MSO04
Course Title	:	Analytical Chemistry
Type of Course	:	Basic Science
Year of Introduction	:	2023-24

Prerequisite	:	Basic applications of instruments
Course Objective	:	Analytical chemists find their role for toxicology examinations, quality control and assessment, analysis of pharmaceuticals, investigations for forensic analysis, development of equipment, etc. Analytical chemists work for a particular private or government laboratory or organization, and also develop particular specialties like food technology, forensics or toxicology.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Evaluate specific analytical technique based on sample and target analyte.
	CO2	Understand the principles of chromatographic techniques.
	CO3	Analyze proper chromatographic technique among the available techniques.
	CO4	Analysis the use of indicator used in different types of titration.
	CO5	Design buffer systems of the required pH.
	CO6	Remember electro analytical techniques based on conductance and emf measurements.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			**Credits**	**Examination Marks**				
				Theory Marks		**Practical Marks**		**Total Marks**
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
4	0	0	4	70	30	-	-	100

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping With COs
1	**Analytical Objectives, Data Handling and Good Laboratory Practice (GLP):** Scope of analytical science and its literature, qualitative and quantitative analysis, Classification of analytical methods, basis of classical and Instrumental method of analysis. GLP- standard operating procedures, quality assurance and quality control. Non-aqueous titrations: principles, theory, role of solvents and their classification, properties of solvents, Standard titration curves, factors affecting non-aqueous titrations, advantages and limitations.	15	25%	CO1
2	**Separation Methods:** Introduction & classification of various separation methods. Chromatography techniques: General introduction, Principles and classification of chromatography according to types of chromatographic bed, physical state of mobile phase, mechanism of separation. Paper chromatography & Thin layer chromatography: Principle, types, choice of paper and solvent, location of spot and measurement of Rf Values.	15	25%	CO2 CO3
3	**pH metry and Conductometry**: pH measurement with glass electrode, working of glass electrode, mechanism of pH measurement, calibration of glass electrode, errors in pH measurement. Electrical conductance in solutions of electrolytes, measurement of conductance, conductometric titrations- acid-base, precipitation and complex formation titrations.	15	25%	CO4 CO5 CO6
4	**Potentiometry and Ion-selective electrodes:** Electrochemical cell, cell potentials, sign convention for electrode potentials, types of reference and indicator electrodes-metallic indicator and membrane indicator electrodes. Classification of membrane electrodes-ion-selective and molecular-selective electrodes. Principle, properties and design of ionselective electrodes. Crystalline and non-crystalline membrane electrodes. Gas-sensing probes and enzyme substrate electrodes. Applications of potentiometric titrations.	15	25%	CO6

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**16.67**	**16.67**	**-**	**33.32**	**16.67**	**16.67**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested Learning Websites

Sr. No.	Name of Website
1	https://onlinecourses.nptel.ac.in/noc22_cy61/preview

Reference Books

Sr. No.	Name of Reference Books
1	Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, 2002.
2	Analytical Chemistry Practice, John H. Kennedy, Saunders College Publishing, Second Edition 1990.
3	Quantitative Chemical Analysis, by Daniel C. Harris, 5th Edition, W.H. Freeman and Company, New York.
4	Analytical Chemistry, by Gary D. Christian, 6th Edition, John Wiley and Sons Inc. New Jersey.
5	Principles of Instrumental Analysis, by Douglas A. Skoog, 3rd Edition, Holt- Saunders International Editions.