

Name of Faculty	:	Faculty of Science
Name of Program	:	Master of Science
Course Code	:	2MSO06
Course Title	:	Physical Chemistry and Analytical Chemistry Practical –II
Type of Course	:	Basic Science
Year of Introduction	:	2023-24

Prerequisite	:	Know instrumentation of various basic physical and analytical techniques.
Course Objective	:	It develops essential laboratory skills required for safe handling of chemicals, to prepare standard solutions, and learns the use of SOP' to operate routine laboratory equipment.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Apply knowledge to determine reaction rate of chemical reactions
	CO2	Create methods for estimation of concentration of electrolytes in mixture using potentiometry, conductometry and pH metry.
	CO3	Estimate the metal ions present in compound analytically.
	CO4	Improve skill to perform experiment of an alytical methods
CO5	Corelate nature of graphs in conductometric titrations	

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	
0	0	8	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.)

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours	Mapping With COs
A. Physical Chemistry Practical:			
I. Conductometry			
1	Test of validity of Ostwald's dilution law and determination of dissociation constant of weak electrolyte like CH_3COOH .	04	CO2 CO5
2	Test of validity of Ostwald's dilution law and determination of dissociation constant of weak electrolyte like ClCH_2COOH .	04	
3	Verification of Debye-Huckel-Onsager's equation in case of strong electrolytes like HCl.	04	
4	Verification of Debye-Huckel-Onsager's equation in case of strong electrolytes like NaCl	04	
5	Precipitation titration- Titration of halides KCl with AgNO_3 .	04	
6	Precipitation titration- Titration of halides KCl + KI with AgNO_3 .	04	
II Potentiometry			
1	To determine the dissociation constant of Acetic acid given in the flask by Potentiometrically.	04	CO2
2	To determine the dissociation constant of monochloro acetic acid given in the flask by Potentiometrically.	04	
II pH metry			
1	Determination of dissociation constant of weak acid like acetic acid	04	CO2
2	Determination of dissociation constant of weak acid like monochloroacetic acid	04	
IV Adsorption and kinetics			
1	Adsorption of acetic acid on activated charcoal	04	
2	Determination of order of reaction and energy of activation between $\text{K}_2\text{S}_2\text{O}_8$ and KI.	04	
V Distribution method			
1	To determine the given unknown concentration of Cu^{+2} by Colorimeter.	04	CO1
2	To determine the given unknown concentration of Ni^{+2} by Colorimeter.	04	
B. Analytical Chemistry Practical:			
1	Estimation of Ca^{+2} and Zn^{+2} by EDTA Titration.	04	CO3
2	Estimation of Ca^{+2} and Mg^{+2} by EDTA Titration.	04	CO3
3	Estimation of Cr^{+3} and Fe^{+3} by EDTA Titration.	04	CO3
4	Estimation of Ca^{+2} and Zn^{+2} by EDTA Titration.	04	CO3

5	Determination of dissolved oxygen.	04	CO4
6	Determination of iodine value of oil.	04	CO4
7	Determination of acid value of oil.	04	CO4
8	Determination of saponification value of oil.	04	CO4
9	Determination of chemical oxygen demand.	04	CO4
10	Determination of Ca in Ginger Sample.	04	CO4
11	Determination of iron in iron tablets.	04	CO4
12	To determination of Chemical Oxygen Demand(COD).	04	CO4
13	To determination of Biological Oxygen Demand(BOD).	04	CO4

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	20	20	20	20	-	20

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.

Major Equipment / Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Conductometer
2	Potentiometer
3	pH meter
4	Weighing Balance
5	Funnel
6	Beaker
7	Burette
8	Pipette
9	Burette stand
10	Conical flask
11	Reagent bottles

Suggested Learning Websites

Sr. No.	Name of Website
1	5: pH Measurement and Its Applications (Experiment) - Chemistry LibreTexts
2	The potentiometer- Comparison of emf (Simulator) : Class 12 : Physics : Amrita Online Lab (olabs.edu.in)
3	https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/General_Chemistry_Labs/Complexometric_Calcium_Determination_(Experiment)
4	https://www.pharmaguideline.com/2013/06/determination-of-biological-oxygen.html

Reference Books

Sr. No.	Name of Reference Books
1	Experimental physical chemistry - R.C. Das, B. Behera
2	Practicals in physical chemistry - P.S. Sindhu
3	Practical physical chemistry -J.B. Yadav
4	Experiments in physical chemistry- P.H. Parsania, F. Karia
5	Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, 2002.
6	Analytical Chemistry Practice, John H. Kennedy, Saunders College Publishing, Second Edition 1990.
7	Quantitative Chemical Analysis, by Daniel C. Harris, 5th Edition, W.H. Freeman and Company, New York.
8	Analytical Chemistry, by Gary D. Christian, 6th Edition, John Wiley and Sons Inc. New Jersey.