COURSE CONTENT

ENGINEERING CHEMISTRY LAB

I Semester: CSE
II Semester: CE / CSD / CSM / ECE / EEE / ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
25X0072	Foundation	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 30				Total Classes: 30		

Prerequisites: Intermediate Chemistry

Course Overview:

The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

Course Objectives:

1. Students will understand and perform experiments based on core chemical principles relevant to engineering applications.
2. Students will learn to estimate the hardness of water to assess its suitability for drinking purposes.
3. Students will acquire the ability to perform acid-base titrations using instrumental methods such as conductometry, potentiometry, and pH metric.
4. Students will gain hands-on experience in synthesizing polymers like Bakelite and Nylon – 6, 6 in the laboratory.
5. Students will learn to determine the unknown concentration of potassium permanganate (KMnO4) using a calibration curve.

Course Outcomes: After Completion of the Course, Students should be able to

CO1: Develop the practical skills through hands-on chemistry experiments relevant to engineering.
CO2: Determine the important parameters such as water hardness and the corrosion rate of mild steel under various conditions.
CO3: Apply the techniques like conductometry, potentiometry, and pH metric to determine concentrations or equivalence points in acid base reactions.
CO4: synthesize the polymers such as Bakelite and Nylon-6,6.
CO5: Determine the unknown concentration of strong acid with strong base by Potentiometry using quinhydrone

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometric method.
II. Conductometry:
    1. Estimation of the concentration of strong acid by Conductometry.
    2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.
III. Potentiometry:
    1. Estimation of concentration of Fe^{+2} ion by Potentiometry using KMnO4.
    2. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone
IV. pH Metry: Determination of an acid concentration using pH meter.
V. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon – 6, 6.

VI. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VII Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of viscosity of lubricant oil using Ostwald's Viscometer.

VII Virtual lab experiments:

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.

OPEN ENDED EXPERIMENTS:

1. Aspirin
2. Paracetamol

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

ELECTRONIC RESOURCES:

1. https://virtual-labs.github.io/exp-microbial-fuel-cell-au
2. https://www.doitpoms.ac.uk/
3. https://phet.colorado.edu/sims/html/circuit-construction-kit-dc-virtuallab/latest/circuit-construction-kit-dc-virtual-lab_en.html