SILVER OAK UNIVERSITY

Engineering and Technology (Diploma)

Department of Chemical Engineering

Subject Name: Applied Chemistry

Semester: 1st Year

Prerequisite: General High School Chemistry

Objective: To make students understand the basics of Physical, Inorganic, Organic and Analytical Chemistry.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme				Total Marks
				Internal		External		
L	T	P	C	Th	Pr	Th	Pr	
3	0	2	4	40	50	60	--	150

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	**Physical Chemistry:** Thermodynamics - The Zeroth law of thermodynamics and temperature, The First law of thermodynamics and enthalpy, reversible expansion, and heat capacity, the Second law of thermodynamics and entropy, The Third law of thermodynamics and absolute entropy, Hess' Law. Chemical Kinetics - Introduction, Reaction rate, Units of rate, Rate laws, Order of a reaction, Zero order reaction, Molecularity of a reaction, Pseudo-order reaction, first order reaction with numerical, second order reaction, third order reaction, units of rate constant.	12	25
2	**Inorganic Chemistry:** Introduction to Periodic Table & its properties, Chemical Bonding, Mole Concept, Theory of solutions, Crystallization as purification technique for Inorganic Salts	8	15
3	**Organic Chemistry:**	9	25

	Introduction, Difference between Organic and Inorganic Compounds, Classification of Organic Compounds, Functional Groups, IUPAC Nomenclature of Aliphatic & Aromatic Organic Compounds, Hybridization in Organic Molecules, Sources of Hydrocarbons, Purification of Organic Compounds		
4	**Analytical Chemistry:** Measurement and understanding of pH, Conductance, Spectroscopic techniques: Principles of Spectroscopy, UV - Visible Spectroscopy and its Application, Analysis of Coal	8	20
5	**Advances in Chemistry and Nano Technology:** Introduction, Elements beyond 100, Particle Accelerators and Large Hadron Collider, Synthesis Approaches: Top down and Bottom up approaches, fullerenes, fullerols, Metal based nanoparticles, Carbon nanotubes and nanowires, Application of Nano Technology in Catalysis	6	15

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	To understand the basic concepts of Thermodynamics and Chemical Kinetics.	1
CO-2	To learn the properties of different elements of Periodic Table and purification techniques of Inorganic salts.	2
CO-3	To gain basic knowledge of Organic Compounds, their nomenclature and structure.	3
CO-4	To illustrate different analytical and measurement techniques.	4
CO-5	To gain knowledge about recent advancements in the field of chemistry and Nano Technology along with their applications.	5

Teaching & Learning Methodology:-

- Practical sessions for developing lab technique and exemplifying the theoretical concepts covered in lectures.
- Lectures with discussions, question and answer sessions, informal quizzes.
- E – Resources for the virtual learning environment.
- Model based learning.

List of Experiments/Tutorials:

- To study the effect of concentration variation on the rate of reaction between sodium thiosulphate and HCl
- To determine the rate constant of the hydrolysis of Ethyl acetate using an acid as a catalyst
- Prepare solutions of different concentrations of various Acids & Bases.

- Identification of Unknown Inorganic Compound
- Purification of an Inorganic Compound (Copper Sulphate) using Crystallization.
- Give the IUPAC name for the given Organic Molecules.
- Identification of Unknown Organic Molecule.
- Purification of an Organic Compound (Camphor) using Sublimation.
- Purification of an Organic Compound (Acetic Acid) using Distillation.
- Determine pH - values of given samples of Solution by using pH meter.
- Determination of strength of HCl solution by titrating it against NaOH solution using conductivity meter.
- To find out the concentration of given $KMnO_4$ solution using spectrophotometer.

Major Equipments:

- pH – Meter
- Conductivity Meter
- UV Visible Spectrophotometer
- Distillation Apparatus
- Electronic Balance
- Temperature Control Bath
- Glassware

Books Recommended:-

- Essential of Physical Chemistry by B. S, Bahl and Tuli., Publisher: S Chand & Co. Ltd, New Delhi
- A textbook of Organic Chemistry by Arun Bahl& B S Bahl, Publisher: S Chand & Co. Ltd, New Delhi.
- A textbook of Inorganic Chemistry by P L Soni, Publisher: Sultan Chand & Sons, New Delhi
- A textbook of Engineering Chemistry by Shashi Chawla, Publisher: Dhanpatrai Publishing Co. Ltd
- Organic Chemistry, Morrison and Boyd, Pearson Education, Singapore.
- Organic Chemistry, I. L. Finar Vol. I & II ELBS & Longmans, Green – UK
- Vogel's textbook of Qualitative Organic Analysis, By Arthur I Vogel, Revised by Jefferey et al. Publisher: Addison Wessley Longmann Ltd, England
- Wiley's Engineering Chemistry, Dr. E.R. Nagarajan, Wiley India Publications

List of Open Source Software/learning website:

- NPTEL / MOOC / SWAYAM Video Lectures
- https://www.coursera.org/
- http://silveroakuni.ac.in/video-lecture