APPLIED CHEMISTRY

Course Objectives:

(1) To understand the basics of molecular interactions.
(2) Introductory idea about organometallics and their catalytic applications.
(3) Basics of fuels an corrosion chemistry.

Module I:

Quantum Chemistry and Spectroscopy: Basic concepts and postulates of quantum mechanics. Introduction to Schrodinger Wage Equation. Particle in a box: Energy levels, quantum members and selection rule.

Spectroscopy: Lambert Beer's Law, Principles and applications of UV-Visible Molecular Absorption Spectroscopy; Chromophores, applications to colorimetry. Effect of conjugation on chromophores, Absorption by aromatic systems, Introductory idea on Rotational and Vibrational Spectroscopy-Principles and application to diatomic molecules. [7 Classes]

The phase rule: Statement of Gibb's phase rule and explanation of the terms involved, Phase diagram of one component system – water and sulfur system, Condensed phase rule, Phase diagram of two component system – Eutectic Bi-Cd system. [3 Classes]

Module II: (10 classes)

Organometallics: Introduction to organometallics, EAN rule; classification, nomenclature and characteristics of organometallic compounds. Applications of organometallic compounds and catalyst in alkene isomerization hydrogenation and hydroformylation (detail mechanisms are to be excluded). [10 Classes]

Module III:

Fuels: Classification of fuels, calorific value. (Determination by Dulong's formula), G.C.V. and Liquid fuels: Classification of petroleum, Refining of petroleum, Cracking, Knocking and anti knocking, cetane and octane numbers. Unleaded petrol, synthetic petrol, power alcohol. Gaseous Fuel: Producer gas, Water gas, LPG, CNG, Kerosene gas, Combustion calculation. [10 Classes]

Module-IV (6 classes)

Corrosion: Electrochemical theory of corrosion, galvanic series, Types of corrosion; Differential metal corrosion, Differential aeration corrosion (Pitting and water line corrosion), Stress corrosion (caustic embrittlement in boilers), Factors affecting, Metal coatings – Galvanizing and Timing, Corrosion inhibitors, cathodic protection.

Text Books:

1. Text Book in Applied Chemistry by A. N. Acharya and B. Samantaray, Pearson India.
2. Introductory to Quantum Chemistry by A. K. Chandra. , 4th Edition, Mcgraw Hill Education.
3. Fundamentals of Molecular & Spectroscopy by Banwell, Tata McGraw Hill Education.
4. Physical Chemistry by Gordon M. Barrow, McGraw-Hill

5. Engineering Chemistry, 12th Edition, Author: Wiley India Editorial Team Publishers Wiley.
6. Engineering Chemistry: Fundamentals and Applications. Shikha Agarwal. Cambridge University Press.
7. Engineering Chemistry, Jain and Jain, Dhanpat RaiPubliation.

Reference Books:

1. Inorganic Chemistry by W. Overton, Rounk and Armstrong, Oxford Univesity Press, 6th edition.
2. Inorganic Chemistry by Donald A. Tarr, Gary Miessler, Pearson India, Third Edition.
3. Quantum Chemistry by Ira N. Levine, Pearson 7th Edition.
4. Molecular Spectroscopy, Ira N. Levine, John Wiley and Sons
5. Modern Spectroscopy – A Molecular Approach, by Donald McQuarrie and John Simon, published by University Science Books.