CHEMISTRY 3-0-0

For 1st Semester Code (RCH1A002)

Course Objectives:

(1) To understand the basics of quantum mechanical concepts and spectroscopy.
(2) To predict the bulk properties and processes using thermodynamic considerations.
(3) To learn an introductory idea about new materials.
(4) To understand the fundamental concepts on fuels and corrosion chemistry.

Module I: [10Classes]

Quantum Chemistry and Spectroscopy: Basic concepts and postulates of quantum mechanics. Introduction to Schrodinger Wave Equation (without derivation), Particle in a box: Energy levels, quantum numbers and selection rule.

Spectroscopy: Lambert Beer's Law, Principles and applications of UV-Visible Molecular Absorption Spectroscopy; Chromophores, applications on quantitative analysis. Effect of conjugation on chromophores, Absorption by aromatic systems, introductory idea on rotational and vibrational SpectroscopyPrinciples and application to diatomic molecules.

Module II: [8 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, Pb-Tin system &Isomorphous System.

Module III: [10 Classes]

Fuels: Classification of fuels, calorific value. (Determination by Dulong's formula), G.C.V. and N.C.V., Solid fuels, Analysis of coal. 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.

Module IV: [08 Classes]

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

Module-V: [10 Classes]

New Materials: Introduction to nanomaterials, classification (0D, 1D, 2D) with examples, size dependent properties, Top-down and Bottom-up approaches of nanomaterial synthesis. Introductory idea on synthesis of nanomaterials via green synthetic route. Application of nanomaterials in environmental fields and electronic devices.