BAS102-ENGINEERING CHEMISTRY

B.TECH. FIRST YEAR

SEMESTER-I

L	T	P	CT	TA	ESE	Total	Credits
3	1	0	20	10	70	100	4

Course Objectives:

1 To Enable the Students to Understand About the Chemistry of Atomic and Molecular Structure, Chemistry of Graphite and its Application.
2 To Enable the Students to Understand the Concept of Electrochemistry, Corrosion and the Detailed Concepts of Spectroscopic Techniques
3 To enable the students to understand the Mechanistic Concept of the Reactions.
4 To Enable the Students to Understand and Apply Detailed Concepts of Hardness of water and analysis of Coal & Determination of Calorific Values.
5 To Enable the Students to Understand Detailed Concepts Related to Polymers, and Organometallic Compounds.

Course Outcomes (COs):

Units	Course Outcomes (COs)	Bloom's Level
CO-1	Get an Understanding of the Theoretical Principles of Chemistry of Molecular Structure, Bonding and Properties, Chemistry of Solid-State Materials.	**K1&K3**
CO-2	Apply the Fundamental Concepts of Determination of Structure with Various Spectral Techniques and Spectroscopy. Basic Concept of Electrochemistry & Corrosion.	**K2&K4**
CO-3	Mechanistic Concept of Organic Reaction, Stability and Effects of Reaction Intermediates. Substitution Reaction and Their Mechanism.	**K5**
CO-4	Develop Understanding of the Sources, Impurities and Hardness of Water, Apply the Concepts of Determination of Calorific Values and Analyse the Coal.	**K2& K3**
CO-5	Develop the Understanding of Chemical Structure of Polymers and its Effect on Their Various Properties When Used as Engineering Materials. Understanding the Applications of Specific Polymers and Organometallic Chemistry and Application in Organic Synthesis.	**K1& K3**

Unit-I

Atomic and Molecular Structure:

Atomic Orbitals, Modern Concept of Chemical Bonding, Sigma & Pi Bonds, Molecular Orbital Theory (MOT). Important Features, LCAO Methods, Molecular Energy Level Diagram of Homo-nuclear Diatomic Molecules (e.g., N_2, O_2), Magnetic Properties and Bond Order, Hydrogen Bonding in a Biological System.

Solid State Materials:

Elementary Ideas of Solid State, Band Theory of Solids, Unit Cell (Cubic System), Point Defects in Solid, Techniques for Structure Determination of Solid Material (e.g., Bragg's Equation). Structure and use of Graphite. (**8 hours**)

Unit-II

Electrochemistry and Corrosion:

Basic Concepts of Electrochemistry. Nernst's Equation and Application, EMF of the Cell, Li-Ion Battery (LIB). Introduction to Corrosion, Types, Causes and Control of Corrosions.

Spectroscopic Techniques:

Elementary Ideas of Lambert & Beer's Laws. Introduction and Application of Spectroscopic Technics (i.e., UV & IR Spectroscopy). (**8 hours**)

Unit-III

Mechanistic Concept of Organic Reactions:

Bond Fission, Free Radicals and Carbocation.

Inductive Effect, Mesomeric Effects and Electrometric Effects

Substitution Reactions:

Nucleophilic Substitution Reactions and their Mechanism (i.e., SN^1& SN^2). (**8 hours**)

Unit-IV

Water Analysis:

Hardness of Water. Techniques for Water Softening (i.e., Lime-Soda, Zeolite & Ion Exchange).

Fuels and Combustion:

Definition, Classification, Characteristics of a Good Fuel, Calorific Values, Gross & Net Calorific Value, Determination of Calorific Value by Bomb Calorimeter, Analysis of Coal by Proximate and Ultimate Analysis Method. (**8 hours**)

Unit-V

Organic Polymers:

Classification, Preparation, Properties of PE, PVC, Polystyrene, Teflon, Buna-Rubber, Nylon-66, Buna-S and Biodegradable Polymers.

Organometallic Compounds:

General Methods of Preparation and Applications of Organometallic Compounds in Organic Synthesis (**8 hours**)

Reference Books:

1. Engineering Chemistry by Rath & Singh, 2nd Edition, Cengage Learning India Pvt Ltd Delhi.
2. Engineering Chemistry by SS Dara, S Chand & Co Ltd
3. Engineering Chemistry by Jain & Jain, S.Chand & Comp, New Delhi
4. Engineering Chemistry by K. Sesha Maheswaramma, Pearson
5. Engineering Chemistry by OG Palanna, Mc Graw Hill Education, New Delhi
6. Engineering Chemistry by Shashi Chawala, Dhanpat Rai Publishing Comp, New Delhi
7. University Chemistry by BH Mahan
8. University Chemistry by CNR Rao