Content Product
Detailed syllabus
ENGINEERING CHEMSTRY - I

UNIT I - POLYMER CHEMISTRY

Introduction to polymers - Introduction to polymers, Classification of polymers, **Polymerisation** - Degree of polymerisation, Functionality of polymerisation, Addition polymerisation, **Condensation and copolymerisation** - Condensation polymerisation, Copolymerisation, **Thermoplastic and thermosetting plastics** - Plastics and its classification, Comparison of Thermoplastics and Thermosetting plastics, Advantages and disadvantages of plastics, **Types and mechanism of polymerisation** - Mechanism of free radical polymerisation, Mechanism of ionic polymerisation, Ziegler- Natta polymerisation (or) Coordination polymerisation, **Properties of polymers** - Properties of polymers, The Number-average molecular weight, The weight – average molecular weight (Mw), **Techniques of polymerisation** - Techniques of polymerisation, Bulk and solution polymerisation, Suspension and emulsion polymerisation, **Nylon 6,6** - Nylon 6,6, Preparation and uses of nylon 6,6, **Epoxy resin** - Epoxy resin.

UNIT II - CHEMICAL THERMODYNAMICS

Terminology of thermodynamics - Terminology of thermodynamics, Thermodynamic properties, Thermodynamic work and heat, Steady state, Thermodynamic equilibrium, **States and properties** - Thermodynamic state and properties, State and path functions, **Second law of thermodynamics** - Second law of thermodynamics, Clausius statement, Kelvin-Planck statement, **Concept of entropy** - Entropy, Characteristics of entropy, Units and physical significance of entropy, **Entropy changes and Clausius inequality** - Entropy change for an ideal gas, Entropy change in reversible and irreversible process, Entropy of phase transition, Clausius inequality, **Free energy and work function** - Work function, Gibbs free energy, **Helmoltz and Gibbs free energy functions** - Helmoltz and Gibbs free energy functions, Criteria of spontaneity, Gibbs Helmholtz equation, roblem based on Gibbs - Helmholtz equation, **Clapeyron and Maxwell's equation** - Clapeyron equation, Clausius – Clapeyron equation, Maxwell's equations, **Vant Hoff's equation** - Vant Hoff's equation for isotherm, Vant Hoff's equation for isochore, Problem based on Vant Hoff's isotherm.

UNIT III - PHOTOCHEMISTRY AND SPECTROSCOPY

Photochemistry - Introduction, Classification of photochemical reactions, Characteristics of photochemical reactions, **Laws of Photochemistry** - Laws of Photochemistry, Stark-Einstein law, Beer - Lambert law, **Quantum efficiency** - Measurement of absorbed intensity, Colorimetric analysis, Quantum yield efficiency, Reasons for high quantum yield, **Photochemical equilibrium** - Photochemical equilibrium, Photochemical synthesis of hydrogen chloride, Photochemical synthesis of hydrogen bromide, **Photoprocesses** - Internal conversion and Intersystem crossing, Fluorescence, Phosphorescence, Differences between Fluorescence and Phosphorescence, Chemiluminescence, Photosensitisation, Application of photosensitisation in photography, **Spectroscopy** - Spectroscopy, Electronic, Vibrational and Rotational transitions, **Types of spectra** - Types of spectra, **UV spectroscopy** - Ultraviolet (UV) and visible (VIS) spectra, Characterisation of UV and visible spectra, Visible and UV spectrophotometer, Applications of UV visible spectrophotometer, **Infrared spectroscopy** - Infrared

spectroscopy, IR spectra of polyatomic molecules, Types of stretching and bending vibrations, IR spectrophotometer, Applications of IR spectroscopy.

UNIT IV - PHASE RULE AND ALLOYS

Phase rule - Introduction to phase rule, Merits and limitations of phase rule, Derivation of phase rule, **One component system** - One component system, Water system, Sulphur system, Reduced phase rule, **Two component system** - Introduction to two component system, Eutectic system, **Different two component system** - Lead silver system, Copper nickel alloy system, Zinc magnesium alloy system, **Alloy** - Introduction to alloy, Effect of alloying elements, **Ferrous alloys or alloy steels** - Ferrous alloys or alloy steels, **Heat treatment of steel** - Heat treatment of steel, Annealing, Hardening and tempering, Normalising and case hardening, **Different heat treatment of steel** - Flame hardening and gas carburizing, Nitriding and cyaniding, **Non ferrous alloy** - Introduction, Brass, Bronze.

UNIT V - NANOCHEMISTRY

Introduction to Nanoparticles - Distinction between molecules, nanoparticles, Size-dependent properties, **Nanoparticles** - Nanoparticles, **Nano cluster and Nano rod** - Nano cluster, Nano rod, **Nanotube(CNT) and nanowire** - Carbon Nano Tubes(CNTs), Nanowire, **Synthesis and precipitation -** Synthesis, Precipitation, **Thermolysis and hydrothermal** - Thermolysis, Hydrothermal, **Solvothermal and electrode position** - Solvothermal, Electrode position, **Chemical vapour deposition** - Chemical vapour deposition, Laser ablation , **Laser ablation properties and applications** - Properties of laser ablation, Applications of laser ablation.