

## Chemical Engineering

### **DEGREE STANDARD**

#### UNIT I

##### CHEMICAL PROCESS CALCULATION AND CHEMICAL ENGINEERING THERMODYNAMICS:-

Properties of gases liquids and solids - Gas laws - Thermodynamics functions - Chemical and Phase Equilibrium - Laws of Thermodynamics - Ideal and non-ideal gases and solutions - partial molal properties - Material and Energy balance involving recycle, by pass and purge, Thermochemistry.

#### UNIT II

##### MOMENTUM, HEAT AND MASS TRANSFER OPERATIONS:-

Newtonian and non-Newtonian fluids, compressible and non - compressible fluids, flow in closed ducts, packed beds and fluidised bed. Continuity and conservation equations. Heat transfer by conduction, convection and Radiation - Heat exchanger equipment. Laws of Diffusion, Theories of mass transfer, Interphase mass transfer. Analogy of the above three operations.

#### UNIT III

##### MECHANICAL OPERATIONS AND RENEWABLE ENERGY SOURCES:-

Size reduction, particle size analysis, mixing and agitation, sedimentation, filtration, flotation: Potential for energy sources, energy conservation, Solar energy, Thermal, Photoelectric, Ocean, Geothermal, Wind energy, Bio-energy sources.

#### UNIT IV

##### ENGINEERING MATERIALS AND SAFETY IN CHEMICAL INDUSTRIES:-

Materials of construction for chemical industries, metallic, non-metallic, ceramic and polymeric materials, corrosion. Industrial safety principles. Site selection and plant layout. Chemical hazards classification. Dangerous occupational health diseases. Engineering control of plants, safety in operations and processes.

#### UNIT V

##### CHEMICAL TECHNOLOGY:-

Inorganic chemical Industries - an overview, Acids, Fertilisers, industrial gases, marine chemicals, cement, glass and ceramics, Refractories, Organic chemical Industries - an overview; natural products. Soap, Sugar, Paper, Rubber, Petroleum products, fermentation products, Intermediates and Dyes.

#### PAPER -II

#### UNIT I

##### Instrumentation and Process Control :-

Principles, on - off, proportional, integral, Derivative and combined modes of control. Feed back control systems and its elements. Analysis of control systems, Measurement and control of Temperature, pressure, flow of fluids, PH and Humidity. Micro processor - based control.

#### UNIT II

##### Design & Optimisation and Environmental Engineering :-

Process selection, flow diagrams, plant location and layout, optimisation techniques. Cost estimation, plant utilities, safety analysis of process plants.

Environmental Engineering sources of impurities. Air and water quality standards, monitoring of pollutants, waste disposal, Noise pollution. Meteorology and air pollution.

#### UNIT III

##### Multi - Phase Mass Transfer Operations :-

Absorption, distillation, liquid - liquid extraction, adsorption, membrane separation process, continuous contact operation and theory. Batch process.

## Chemical Engineering

### UNIT IV

Chemical Reaction Engineering:-

Chemical Kinetics, interpretation of rate data in variable volume and constant volume systems ideal reactors. Concept of ideality. Development of design expression for batch, tubular, and stirred tank reactors, combined reactors, comparison advantages and limitations in applications, thermal characteristics of reactors. Isothermal, adiabatic, non adiabatic condition - principles of reactor stability.

### UNIT V

Numerical Methods and Computational Techniques :-

Empirical laws and curvefitting - Equations with real Co-efficients and imaginary roots - equations with rational coefficients and irrational roots - symmetric functions of the roots - Transformation of equations. Numerical solutions of linear - algebraic equations. Numerical solutions of non - linear - algebraic equations - solution of initial value ordinary differential equations. Boundary value of non - linear ODE - solution of partial differential equation.