

CHEMICAL ENGINEERING

A. FUNDAMENTALS & STOICHIOMETRY:

Definition and scope of chemical engineering, Units and dimensions, Dimensional analysis, Graphical and numerical methods of data fitting.

Properties of gases, liquids and solids.

Material balance of simple and complex systems with and without chemical reaction. Recycle, bypass and purging.

Energy balance of simple systems with and without chemical reactions.

B. MATERIAL SCIENCE AND CORROSION:

Crystallography : Concepts of crystalline and non-crystalline materials, Mechanical properties, phase diagram heat treatment.

Materials of construction: metals and alloys for construction, ceramics, refractoriness, polymers. Materials selection and economics.

Corrosion : causes, control and preventive measures

C. ENERGY RESOURCES AND UTILIZATION:

Classification and survey of energy resources, Scope of utilization.

Solid fuels: Various types, physical and chemical characteristics.

Coal: Classification, origin, carbonization gasification, storage and handling preparation.

Liquid fuels from petroleum Synthetic liquid fuels.

Gaseous fuels: Classification, composition, calorific value, manufactures of synthetic gaseous fuels, Combustion.

Nuclear energy and hydropower.

Solar and other renewable sources of energy, viz., biomass, MSW, wind, total and geothermal energy.

D. FLUID FLOW OPERATIONS:

Classification and properties of fluids. Hydrostatic equilibrium, manometers.

Types of flow, Reynolds number Newtonian and non-Newtonian fluids, Bernoulli equation and its applications, fluid friction, Hagen-Poiseuille equation.

Fluid flow measurements.

Fluidization : mechanism and uses.

Fluid machinery : pumps, turbines, compressors and blowers.

E. CHEMICAL TECHNOLOGY (INORGANIC) :

Water L hard and soft water, boiler water, municipal water treatment, desalination.

Acid industry : Sulfuric, nitric and hydrochloric acid.

Chloral-alkali industry : Ammonia synthesis, Fertilizers natural, nitrogenous, phosphates, potassium and mixed fertilizers.

Marine chemicals : Sodium chloride, recovery of compounds of K, Ms, Ca, Br, and I, Lime and its products Cement.