PRINCIPLES OF CHEMICAL ENGINEERING
(Qualitative Treatment Only)

Course Code: 15CH1101

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Course Outcomes:

On successful completion of the course, the student should be able to

CO 1 Write about the importance of Chemical Engineering and dimensions.

CO 2 Describe the importance of material balances, types of fluids, fluid flow and fluid moving machinery.

CO 3 Describe the importance of heat transfer and the related equipment.

CO 4 Describe the importance of mass transfer operations and the equipment of mass transfer operations.

CO 5 Identify the materials for construction and the economics and profitability of the process.

UNIT-I (8 Lectures)

What is Chemical Engineering? The role of Chemical Processing, Describing quantities*:* units, dimensional consistency.

UNIT-II (11 Lectures)

MATERIAL BALANCES:

Conservation of mass for species in mixing, splitting, with and without chemical reaction.

FLUID FLOW:

Concepts of pressure, principles of fluid flow, Bernoulli equation, effect of fluid friction, pumps and turbines.

UNIT-III (12 Lectures)

HEAT TRANSFER:

Energy balance for steady state open systems. Rate of heat transfer for conduction, convection and radiation. Application of steady state energy balance equation for sensible heat transfer, phase change and for chemical reaction.

HEAT EXCHANGE DEVICES:

Cocurrent and counter current flow, 1-1 shell and tube heat exchanger.

UNIT-IV (11 Lectures)

MASS TRANSFER:

Molecular diffusion, mass convection, mass transfer across phase boundaries, Liquid-liquid extraction, Gas-liquid Absorption, Distillation.

CHEMICAL REACTION ENGINEERING:

Describing reaction rates, energy requirements in reaction and concepts of batch, CSTR and PFR

UNIT-V (9 Lectures)

Materials: Metals and corrosion, ceramics, polymer, composites

Economics: Capital and operating costs, profitability

TEXT BOOKS:

1. Kenneth A Solen & John.N.Harb, *"Introduction to Chemical Engineering"*, 5th Edition, John Wiley, 2011.
2. Ghoshal S.K., Sanyal S.K and Dutta S, *"Introduction to Chemical Engineering"* Tata McGraw Hill Publication New Delhi 1993.