

(CH506) CHEMICAL PROCESS EQUIPMENT DESIGN

Objective of the Course :

To design safe and dependable processing facilities in a cost effective manner. This focuses on design of adiabatic reactors and multi component equipments.

UNIT - I

Shell and Tube Heat Exchanger Design: 1-2 parallel – counter flow: Shell and Tube Exchanger, Flow arrangements for increased heat recovery, Calculations for process conditions.

Condenser and Evaporator Design: Condensation of single vapor, Multiple Effect Chemical Evaporation: Calculations of Chemical Evaporators, Thermo compression: Design of thermo compression sugar evaporator.

UNIT - II

Towers: Introduction, Contacting Devices, Choice between Packed Columns and Plate columns, Tower Packings, Choice of plate types, Plate calculations, Transfer unit calculations, Column diameter. Packed Towers: Introduction, Type and Size of Packings, Flooding, Pressure Drop, Foam, Holdup, Degree of Wetting, Column Diameter, Height of Packing, Design of a Packed Tower for Distillation, Optimum Design.

UNIT - III

Sieve Tray Design: Introduction, Sieve Trays: Tower Diameter, Plate Spacing, Entrainment, Weepage, Tray Layout, Hydraulic Parameters, Worksheet for Sieve Tray Design, Design of a Sieve tray Tower for Distillation.

UNIT - IV

Mechanical Design: Introduction, The Mechanical Design of Heat Exchangers: General Thicknesses of various components, The Mechanical Design of Columns: Vessel Design, Vessel Supports, Manholes and Flanges, Materials of Construction.

UNIT - V

Scale up of Process Equipment: Introduction, Basic Principles of Scale-up, Scaleup of Heat Exchange Systems, Scale-up of Chemical Reactors, Scale-up of Fluid Flow systems.

TEXT BOOKS:

1. D.Q.Kern, "Process Heat Transfer", Mc Graw Hill Co.
2. Backhurst and Harker, "Process Plant Design", Heinmann Educational Books.

REFERENCE BOOKS :

1. M.V.Joshi, "Process Equipment Design", McMillan India.
2. Coulson and Richardson, "Chemical Engineering", Volume 6 Pergamon Press.