

UG
Course Code: **CH210**
Credit: **4**
Version: **1**
Prerequisite Course: **Nil**

Department: **Chemical Engineering**
Course Name: **Mass Transfer-I**
L-T-P: **3-1-0**
Approved on:

Physico-chemical basis of separation processes- thermodynamic considerations, stage and continuous contacting operations, concepts of equilibrium stage, operating line and tie line.

Binary Distillation: Ideal and non- ideal stages; definitions of point, stage and column efficiencies. Single stage calculations: differential (Rayleigh) and simple (flash) distillation, liver rule. Steam distillation. McCabe-Thiele diagram; plate calculations, simple and complex fractionators. Ponchon-Savarit Diagram: Adiabatic and non-adiabatic.

Absorption, liquid-liquid extraction, adsorption and leaching.

Batch leaching and its similarity to simple leaching. Calculation of stages in a sequence with and without reflux.

Design of Gas-Liquid and Liquid-Liquid Plate Contactors. Flooding, tray layout, ΔP , tray hydraulics, column height and overall design. Flashing equipment design, Multi-component distillation, Azeotropic and extractive distillation, Variable specification and key components, Short-cut methods: Underwood and Gilliland, Feed plate location, Product composition, Matrices and Plate to Plate Calculations: Thiele-Geddes Method.

Books

1. Treybal, R. E., "*Mass transfer operations*", 3rd ed. McGraw-Hill, NY, 1980.
2. King, C. J., "*Separation Processes*", McGraw-Hill, NY.
3. Smith, B. D., "*Design of Equilibrium Stage Processes*", McGraw-Hill, NY.
4. McCabe, W. L., Smith, J. C. and Harriot, P., "*Unit Operations of Chemical Engineering*", 6th ed., McGraw-Hill, NY.
5. Coulson, J. M. and Richardson, J. F., "*Chemical Engineering*", Vol. I and II, 4th ed., Asian Books Pvt. Ltd., New Delhi.