

UG
Course Code: **CH404**
Credit: **3**
Version: **1**
Prerequisite Course: **Nil**

Department: **Chemical Engineering**
Course Name: **Advanced Separation Processes**
L-T-P: **3-0-0**
Approved on:

Introduction

Separation process in chemical and Biochemical Industries, Categorization of separation processes, equilibrium and rate governed processes. Introduction to various new separation techniques e.g. Membrane separation, Ion-exchange foam separation, supercritical extraction, liquid membrane permeation, PSA & Freeze drying.

Membrane based Separation Technique (MBSTs)

Historical background, physical and chemical properties of membranes, Techniques of membrane preparation, membrane characterization, various types of membranes and modules. Osmosis and osmotic pressure. Working principle, operation and design of Reverse osmosis, Ultrafiltration, Microfiltration, Electrodialysis and Pervaporation. Gaseous separation by membranes.

Ion Exchange

History, basic principle and mechanism of separation, Ion exchange resins, regeneration and exchange capacity. Exchange equilibrium, affinity, selectivity and kinetics of ion exchange. Design of ion exchange systems and their uses in removal of ionic impurities from effluents.

Introduction to foam separation, micellar separation, supercritical fluid extraction, liquid membrane permeation and chromatographic separation.

Books

1. King, C.J., "*Separation Processes*", Tata McGraw-Hill.
2. Sourirajan, S. and Matsura, T., "*Reverse Osmosis and Ultra-filtration - Process Principles*," NRC Publications, Ottawa, 1985.
3. Porter, M. C., "*Handbook of Industrial Membrane Technology*," Noyes Publication, New Jersey, 1990.
4. Henry, J. D. and Li, N. N., "*New Separation Techniques*", AIChE Today Series, AIChE (1975).
5. Hatton, T. A., Scamehorn, J. F. and Harvell, J. H., "*Surfactant Based Separation Processes*", Vol. 23, Surfactant Science Series, Marcel Dekker Inc., New York 1989.
6. McHugh, M. A. and Krukonis, V. J., "*Supercritical Fluid Extraction*", Butterworths, Boston, 1985.