PCH107 SEPARATION PROCESSES

L	T	P	Cr
3	2	0	4

Course Objective:
To learn conceptual design of separation processes and design of equipment involved.

Distillation: Vapor liquid equilibrium, Binary distillation, Bubble point and dew point temperature of multi-component mixture, Distillation of multi-component mixtures, Fenske-Underwood-Gilliland method, Selection of two key components, Column operating pressures, Distribution of non-key components at total and actual reflux, Feed stage location, Azeotropic distillation, Extractive distillation, Reactive distillation, Divided wall distillation.

Liquid-Liquid Extraction: Liquid-liquid equilibrium, Equilateral triangular coordinates, Choice of solvent, Stage wise contact, Multi-stage cross-current extraction, Multi-stage counter current withoutreflux, Maloney-Schubert graphical equilibrium stage method, Determination of number of equilibrium stages by graphical methods, Extraction with intermediate feed and reflux, Extraction efficiency,Liquid-liquid extraction with chemical reaction, Hunter-Nash graphical equilibrium stage method, Number of equilibrium stages, Minimum and maximum solvent to feed flow rate ratios.

Crystallization: Solid-liquid equilibrium, Nucleation, Crystal growth, Elements of precipitation, Industrial crystallizers, Crystallizer operation and design.

Adsorption: Sorbents, Sorption system, Ion exchange equilibria, Equilibria in chromatography, Kinetic and transport consideration, Mass transfer in ion exchange and Chromatography, Fixed bed adsorption, Breakthrough curve, Continuous counter current adsorption system, Chromatographic separations.

Course learning outcomes (CLOs):

The students will be able to

1. Design distillation column by shortcut methods
2. Solve multistage liquid-liquid extraction problem
3. Solve the problem related to crystallization
4. Solve the problem related to adsorption

Recommended Books:

1. *Seader, H., and Henley, J.E.,Separation Process Principles, Wiley India(2007)*
2. *Geankoplis, C., Transport Processes and Unit Operations, Prentice-Hall of India (1993).*
3. *Holland, C.D., Fundamentals of Multi-component Distillation, McGraw Hill (1981).*
4. *Sherwood, T.K., Pigford, R.L., and Wilkes, C.R., Mass Transfer, McGraw Hill (1975).*

Evaluation Scheme:

S.No.	Evaluation Elements	Weightage (%)
1.	MST	30
2.	EST	45
3.	Sessional (may include Assignments/Projects/Tutorials/Quizes/Lab Evaluations)	25