

## UCH602: MASS TRANSFER-II

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>1</b>	<b>3</b>	<b>5.0</b>

### Course Objectives:

To impart the knowledge of separation processes like distillation, adsorption, and extraction.

**Distillation:** Vapor-liquid equilibria, Flash distillation, Differential distillation, Continuous Rectification- Binary system, Steam distillation, Multistage tray tower- McCabe-Thiele method, Ponchon-Savarit method, Distillation in a packed tower, Principles of azeotropic and extractive distillation, Bubble point and dew point calculation of multi-component system, Introduction to multi-component distillation.

**Liquid-Liquid Extraction:** Equilibrium relationship for partially miscible and immiscible systems, Selectivity and choice of solvent, Stage wise contact, Single stage and multistage extraction, Determination of number of equilibrium stages by graphical methods, Different types of extraction equipment.

**Adsorption:** Adsorption equilibria, Batch and continuous adsorption, Selection of adsorbent, Specific surface area of an adsorbent, Break-through curve, Introduction to ion-exchange processes.

**Solid-Liquid Extraction:** Classification of solid liquid extraction systems, Solid liquid extraction equilibria, Determination of number of equilibrium stages by graphical methods, Solid liquid contacting equipment.

**Laboratory work:** Study of vapour liquid equilibria, Cross current leaching, HETP in a packed distillation column operating under total reflux, Liquid in air diffusion, Liquid-liquid extraction apparatus, Absorption in packed bed apparatus, Wetted wall column, Solid in air diffusion apparatus, Batch drying unit, Batch distillation apparatus, Batch crystallizer, Water cooling tower, Steam distillation apparatus.

### Course Learning Outcomes (CLO):

Upon completion of this course, the students will be able to:

1. use the phase equilibrium concepts in mass transfer related problems.
2. design staged /packed column for mass transfer operations.
3. solve problems related to adsorption.
4. solve problems related to liquid-liquid and solid-liquid extraction.

### Text Books:

1. Treybal, R.E., *Mass Transfer Operations*, McGraw Hill (1980).
2. McCabe, W.L., and Smith, J.C., *Unit Operations of Chemical Engineering*, McGraw Hill (1993).
3. Sieder J.D., Ernest J.Henley. *Separation Process Principles* (2011).

**Reference Books:**

1. *Holland C.D., Fundamentals of multicomponent distillation, Prentice-Hall of India (1963).*
2. *Geankoplis, Transport Processes and Unit Operations, Prentice-Hall of India (1993).*
3. *Sherwood, T.K., Pigford, R.L., and Wilkes, C.R, Mass Transfer, McGraw Hill (1975).*
4. *Skelland, A.H.P., Diffusional Mass Transfer, John Wiley & Sons (1985).*

**Evaluation Scheme:**

S. No.	Evaluation Elements	Weightage (%)
1	MST	25
2	EST	35
3	Sessional (May includes lab/ tutorials/ assignments/ quiz's etc)	40