

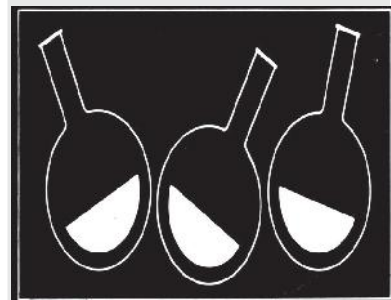
16CH303 MASS TRANSFER OPERATIONS-I

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	30	25	48	-	5	5	5



Course Description and Objectives:

The course deals with mass transfer phenomena and its usage for engineering application. The objective of this course is to familiarize the student on various mass transfer operations, such as absorption, stripping, humidification and drying, and design of various mass transfer equipments.

Course Outcomes:

The student will be able to :

- recognize the various modes of mass transfer.
- understand the principles behind mass transfer operations.
- determine the rate of mass transfer.
- estimate mass transfer diffusion coefficient.
- solve unsteady state diffusion problems.

SKILLS:

- ✓ *Estimate the diffusion coefficients for binary and ternary mixtures.*
- ✓ *Suggest specifications for designing mass transfer equipments.*
- ✓ *Test the working condition of the humidifier and dehumidifier.*
- ✓ *Test and design of gas-liquid contact equipments.*
- ✓ *Test the virtual mass transfer operations.*

ACTIVITIES:

- *Estimation of diffusivity coefficient using virtual operations.*
- *Estimation of drying properties like critical moisture and equilibrium moisture using Matlab.*
- *Estimation of mass transfer coefficient for gases and liquids using Matlab.*

UNIT - 1**L-9**

DIFFUSION AND MASS TRANSFER : Mass transfer operations, Molecular diffusion in fluids, Binary solutions, Fick's Law, Equation of continuity, Steady state equimolar counter current diffusion, Application of molecular diffusion, Theories of mass transfer, Diffusion in fluids, Reynolds analogy, Heat and mass transfer coefficients in laminar and turbulent flow, Diffusion through solids.

UNIT - 2**L-9**

INTERPHASE MASS TRANSFER : Concept of equilibrium, Diffusion between phases, Material balances in steady state, Co-current and counter current stage processes, Sparged vessels mechanically agitated vessels for liquid gas (single phase), Venturi scrubbers, Sieve tray design for absorption tray tower verses packed tower.

UNIT - 3**L-9**

ABSORPTION AND STRIPPING : Introduction, Counter and co-current isothermal absorption and stripping of single component, Operating lines, Minimum flow rate, Determination of number of transfer units and height of continuous absorber, Determination of no. of plates, Absorption factor, Kremser-Brown equations.

UNIT - 4**L-9**

HUMIDIFICATION : Introduction, Vapor– pressure curve, Definitions, Psychometric charts, Enthalpy of vapor–gas mixtures, Humidification and dehumidification, Operating lines and design of packed humidifiers, Cooling towers.

UNIT - 5**L-9**

DRYING : Introduction, Definitions of various moisture contents, Drying conditions, Rate of Batch drying under constant drying conditions, Mechanism of batch drying, Drying time through circulation drying, Batch and continuous drying.