4thSemester	RCH4C001	Mass Transfer- I	L-T-P 3-0-0	3 CREDITS

Module I: **(07 hrs)**

Introduction to Mass transfer operations, molecular diffusion in fluids, binary solutions,Fick's law, equation of continuity, steady state equimolar counter current diffusion, Stefan-Maxwell equation.

Module II: **(08 hrs)**

Diffusivity of gases and liquids, application of molecular diffusion, masstransfer coefficients, in laminar and turbulent flow, Interphase mass transfer, Film theory,Penetration theory, surface-renewal theories, analogy between mass, heat and momentumtransfer.

Module III: **(10 hrs)**

Absorption : Solubility of gases in liquids, two components system, multi componentsystem, ideal and non - ideal solutions, choice of solvent for absorption, single componentabsorption material balance, counter current multistage operations, dilute gas mixtures,non - isothermal operation, tray efficiency, continuous contact equipment, HETP, HTU, NTUconcepts for single component absorption.

Module IV: **(10 hrs)**

Principle of VLE for binary systems, phase diagrams, relative volatility, ideal solutions,azeotropes, enthalpy concentration diagrams, flash vaporization, partial condensation,differential distillation steam distillation, azeotropic and extractive distillation. Continuousdistillation: McCabe - Thiele method, Ponchon - Savarit method, Tray efficiencies,introduction to multi component distillation.

Module V: **(10 hrs)**

Humidification operations: Definition of fundamental terms, Psychometric charts, theory ofadiabatic saturation and wet bulb temperature, Lewis relation, Gas liquid contact,Dehumidification, Adiabatic Humidification. Equipments: Natural Circulation, Natural draft,Mechanical draft, Spray tower, Spray chamber, Spray pond. Humidity Measurement: Directchemical method, Hygrometer method, Sling psychrometer, Dew point method, Mirrormethod.

Books:

- Mass Transfer Operations by R E Treybal, McGraw Hill.
- Unit Operations of Chemical Engineering, 7th ed. by W L McCabe, J C Smith, and P Harriott, McGraw-Hill.
- Design of Equilibrium Stage Processes by BDSmith, McGraw-Hill.
- Principles of Mass Transfer and Separation Processesby B K Dutta, PHI.
- Mass Transfer Operations by ASuryanarayana,New Age International