# PCCH4302 MASS TRANSFER - I (3-0-0)

### Module - I

Introduction to Mass transfer operations, molecular diffusion in fluids, binary solutions, Fick's law, equation of continuity, steady state equimolal counter current diffusion, Stefan's equation, diffusivity of gases and liquids, application of molecular diffusion, mass transfer coefficients, in laminar and turbulent flow, Film theory, Penetration theory, surface-renewal theories, analogy between mass, heat and momentum transfer.

## Module – II

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.

Continuous distillation: Mc Cabe - Thiele method, Ponchon - Savarit method, Tray efficiencies, introduction to multi component distillation.

### Module - III

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

### Module - IV

Humidification Operations : Definition of fundamental terms, Psychometric charts, theory of adiabatic 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: Direct chemical method, Hygrometer method, Sling psychrometer, Dew point method, Mirror method

### Textbooks and References :

1. R. E. Treybal, Mass Transfer Operations, McGraw Hill, New York.

2. Mc Cabe & Smith., Uni Operations in Chemical Engineering, Mc Graw Hill International Edn

3. B. D. Smith, Deisgn of Equilibrium Stage Process, Mc Graw Hill.

4. J. M. Coulson and J. F. Richardson, Chemical Engineering, Vol - II, Asian books private Ltd.

5. A.Suryanarayana, Mass Transfer Operations: New age international publishers