CEPC3003 MASS TRANSFER – II (3-0-0)

Overall Course Objectives:

CO- The objective of this course is to introduce the mass transfer operations and how to quantify, formulate, and solve engineering problems involving different mass transfer operations like distillation, leaching, liquid-liquid extraction, absorption. To demonstrate that how to apply mass balances and its transfer and analyze systems.

Course Outcomes:

CO1: To understand the basic concepts and principles of mass transfer operation like distillation, absorption, liquid-liquid extraction, solid-liquid extraction (leaching).
CO2: How to identify, quantify or formulate, and solve the engineering problems involving mass transfer.
CO3: Design and analysis of mass transfer processes and equipments.
CO4: Applications of mass transfer phenomena and its optimum use.

Module I: (12 hrs)

Liquid-liquid operations: Extraction: Introduction, liquid-liquid equilibrium, analytical and graphical solutions for single and multistage operations, continuous counter-current operation without and with reflux, fractional extraction, equipment for liquid contacting operations, single stage, multistage and continuous contacting equipment.

Module II: (12 hrs)

Leaching: Steady and unsteady state operations, equipments, analytical methods for single and multistage operations.

Module III: (08 hrs)

Drying: Equilibrium, drying rate curve, batch and continuous drying, time of drying and calculations, mechanism of batch drying, equipments for batch and continuous drying operations, design of dryers.

Module IV: (10 hrs)

Adsorption: Theory of adsorption, Industrial adsorbents, adsorption equilibrium – isotherms and isobars, Freundlichisotherm, single and multistage operations, Ion-Exchange.

Text Book:

1. Mass Transfer Operations by R E Treybal, McGraw Hill.
2. Principles of Mass Transfer and Separation Processes by B K Dutta, PHI.

Reference Books:

1. Unit Operations of Chemical Engineering, 7th ed. by W L McCabe, J C Smith, and P Harriott, McGraw-Hill.
2. Design of Equilibrium Stage Processes by B D Smith, McGraw-Hill.
3. Mass Transfer Operations by ASuryanarayana, New Age International.