UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

LESSON PLAN

SUBJECT-MASS TRANSFER-I

PREPARED BY-DR.SUBASINI JENA

DEPARTMENT OF CHEMICAL ENGINEERING

WEEK	Topics to be covered
WEEK 1	Importance of mass transfer operations
	General principle of mass transfer operations
	Classify mass transfer operations
	Molecular diffusion and inter phase diffusion
	Two film theory, Penetration theory for diffusion
	Diffusion in gases and liquids
	Mathematical formula for diffusivity for diffusion in gas and liquid
WEEK 2	Explain Fick's law & mass transfer coefficient
	Problem solving on Fick's Law
	Correlation between overall mass transfer coefficient and gas/liquid film mass transfer coefficient
	Definition and terminologies of Distillation
	Types of boiling point diagrams
	Enthalpy concentration diagrams
	Vapour liquid equilibrium
WEEK 3	Relative volatility and derive an expression between $\propto$ & x-y
	Draw XY data (equilibrium curve) for different system in graph paper
	Simple distillation & Derivation of Rayleigh's equation
	Solve problems based on Rayleigh's equation
	Flash distillation and material balance in flash distillation
	Continuous rectification of binary system
	Construction of rectification column
WEEK 4	Types of trays

	Types of re-boiler
	Channeling, weeping, entrainment and flooding
	Analysis of fractionating column by McCabe and Thiele Method
	Material balance equations of fractionating column
	Problem based on feed plate location
	Problem based on McCabe and Thiele Method
WEEK 5	Reflux ratio and concept of minimum reflux ratio
	Optimum and total reflux ratio
	Plate efficiency, Murphee's efficiency
	Steam distillation and its application
	Azeotropic distillation
	Extractive distillation
	Revision and MCQ discussion
WEEK 6	Principles of absorption , types of absorption
	Factors affecting rates of absorption
	Comparison between absorption and distillation
	Material balance on absorption
	Effect on pressure drop, minimum gas-liquid ratio
	Types of packing materials used in absorption
	regular and random packing
WEEK 7	Loading, flooding, HETP
	Elementary ideas about wetted wall column
	Elementary ideas about spray tower
	Different equipments used for absorption
	Comparison of equipments used for absorption
	Types of packing materials used in absorption
	Regular and Random packing
WEEK 8	Revision of the chapter
	The principles of adsorption
	Comparison between absorption and adsorption
	Types of adsorption
	Factors affecting adsorption
	Different types of adsorbents
	Nature of adsorbents
WEEK 9	Elutriation, percolation
	Industrial application of adsorption
	Construction of Industrial adsorption equipment
	Operation of Industrial adsorption equipment

BOOKS FOR REFERENCE:

Separation Operation by Binay Dutt, PHI Publication
Unit Operation-II by K.A Gavane, Nirali Publications
Unit operation of Chemical Engineering by Mc Cabe & J M Smith, Tata Mc Grawhill Publication.

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