



Strategic Plan for Learning and Teaching
Department of Chemical Engineering

Branch Name:	Chemical Engineering (CHE)	Session :	2018-2019
Subject Name:	Separation Processes-I	Year:	3 rd
Subject Code:	CHE 501	Semester :	5 th

Course Objective:	To impart the students different separation technique methods.
Course Outcome:	<ul style="list-style-type: none"> At the end of the study students will come to know about diffusional mass transfer, interface mass transfer. Design of a absorber and a adsorber. Design calculation of distillation column. Chromatographic separation

Teaching-Learning Plan:

Lecture Class No.	Reference to the WBUT Syllabus	Subject Topics to be discussed/ covered/ delivered	Text book / Referred book Sl.No.
1	Module-I	Introduction of Mass Transfer and its importance; Different type of Mass Transfer operations, definitions and their applications.	1,2,4
2		Principles of molecular diffusion and diffusion between phases, Fick's Law, Diffusivity, Effect of temperature and pressure on diffusivity, Equation of continuity, Problems on diffusivity.	
3		Concept of rate of diffusion (flux) at stationary co-ordinate system and moving co-ordinate system, derivation of flux equation.	
4		Derivation of diffusion of <i>A</i> through stagnant, non-diffusing <i>B</i> , related problems.	
5		Derivation of equimolar counterdiffusion of <i>A</i> and <i>B</i> , related problems.	
6		Diffusion in a tube with change in path length, related problems.	
7		Diffusion through a varying cross-sectional area, related problems.	
8		Molecular diffusion in liquids, diffusion coefficients for liquids, related problems, Molecular diffusion in solids, types of diffusion in solids, related problems.	
9		A definition of Mass transfer coefficient, other definitions of mass transfer coefficient, correlation of mass transfer coefficients, mass transfer across interfaces.	
10		Relation between overall and individual Mass transfer coefficients, related problems.	
11		Analogy between momentum, heat and mass transfer.	
12		Concept of stage wise processes, related problems.	
13	Module-II	Introduction, The mechanism of absorption, Absorption equipment	1,4
14		Diameter and height calculations for packed columns, Kremser equation, H. E. T. P. , H. T. U. , and N. T. U. concepts.	
15		Related problems.	
16		Packed tower design, height of column based on conditions in the gas film.	
17		Related problems.	
18		Height of column based on conditions in the liquid film.	
19		Related problems.	

20		height of column based on overall coefficients.	
21		Related problems.	
22		Plate type towers, number of plates by use of absorption factor.	
23		Related problems.	
24	Module-III	Introduction, Vapor -liquid equilibria, Relative volatility, Ideal and non -ideal solutions.	1,4,5
25		Batch Distillation, related problems.	
26		Differential Equilibrium Distillation, related problems.	
27		Equilibrium Distillation, related problems.	
28		Fractional Distillation, Rectification of binary systems, calculation of number of plates in a distillation column by McCabe-Thiele method.	
29		Calculation of number of plates in a distillation column by McCabe-Thiele method.	
30		Importance of reflux ratio, tray efficiency, problems on McCabe-Thiele method.	
31		Problems on McCabe-Thiele method.	
32		Problems on McCabe-Thiele method.	
33		Enthalpy concentration diagram, calculation of number of plates by Ponchon and Savarit method.	
34		calculation of number of plates by Ponchon and Savarit method, problems on Ponchon and Savarit method.	
35		Problems on Ponchon and Savarit method.	
36		Design of rectification column.	
37		Design of rectification column.	
38		Problems on Design of rectification column.	
39		Module-IV	
40	Introduction to multicomponent distillation.		
41	Introduction, nature of adsorbents, batch adsorption.		
42	Adsorption isotherms, Freundlich equation, related problems.		
43	Langmuir equation, BET equation, related problems.		
44	Breakthrough curves, related problems.		
45	Adsorption equipment, design of fixed bed adsorption column.		
46	Schedule for a Class Test		

Recommended Text/ Reference Books/ Journals:

Sl.No	Name of Text/ Reference Book/ Journals	Name of Author	Publisher & edition
1	Mass Transfer Operations	Robert E. Treybal,	MGH, International Student Edition.
2	Principles of Mass Transfer and Separation Processes	Binay K. Dutta	PHI Learning Pvt. Ltd
3	Unit Operations in Chemical Engineering	McCabe, Smith, and Harriot.	MGH, Sixth Edn.
4	Mass Transfer Theory and Practice	N Anantharaman	PHI Learning Pvt. Ltd
5	International Journal of Heat and Mass Transfer		Elsevier.
6	Journal of Separation Science and Technology		Taylor & Francis

Course Co-ordinator / Faculty

Sl. No.	Name of the Course Co-ordinator / Faculty	Signature of Course coordinator / Faculty		Signature of HOD	
1	Dr. Projjwal Sarkar				
2	Dr. Pronoy Kumar Sinha				