Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2018-2019

Course Handout Part II

Date: 07-01-2019

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : *CHE F244*
Course Title : *Separation Processes 1*
Instructor-in-Charge : *D.PURNIMA*

Scope and Objective of the Course:

Introduction to molecular diffusion and mass transfer coefficients; interphase mass transfer. Application of the principles in design of absorption, distillation, extraction and leaching processes. The course will enable the student to design the continuous contact and tray type equipment required for mass transfer.

Textbooks:

T1. Mass Transfer Operations, Robert E. Treybal, Third Edition, McGraw Hill.

Reference books

R1 Binay .K. Dutta ,"Principles of mass transfer and separation processes", PHI Learning Pvt Ltd, India, 2007

R2. McCabe, W. L., Smith, J. C., Harriott, P., "Unit Operations of Chemical Engineering," 7th Ed. (International Edition), McGraw-Hill Education (Asia), Singapore, 2005.

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1	Introduction to separation processes	Unit operations and unit process, Basic concepts	Chapter 1 T1
2-4	Molecular diffusion in fluids	Molecular diffusion and fluxes, Molecular diffusion in Gases (stagnant film, equimolal counter diffusion), Diffusivity of gases and liquids.	Chap.2, T1
5-13	Mass transfer coefficients, interphase mass transfer	Relations between mass transfer coefficients, Reynolds analogy. Equilibrium, diffusion between phases, material balances, stages.	Chap 3,5 T1
14-20	Gas absorption (Equipment for	Equilibrium solubility of gases in liquids, one component transfer: material balance for	Chap. 6T1

	absorption)	counter – and co-current processes, multi stage operations, non-isothermal operations, calculation of height of packed absorber/desorber, multi-component systems, absorption with chemical reaction.	
21-32	Distillation (equipments for distillation)	Vapor-liquid equilibrium, flash vaporization, differential distillation, Continuous distillation, multistage columns, overall mass and enthalpy balances, McCabe-Thiele method, Ponchon-Savarit method, use of open steam, multiple feed, side streams, azeotropic and extractive distillations.	Chap. 9 T1
33-36	Liquid extraction (equipments for extraction)	Liquid-liquid equilibrium, distribution curves, triangular and solvent free coordinates, systems of three liquids-one pair partially soluble, insoluble liquids, effect of temperature, continuous counter-current multi-stage extraction, continuous counter-current extraction with reflux.	Chap. 10, T1
37-40	Leaching(equipments for leaching)	Solid-liquid extraction, underflow and overflow locus, Multistage cross current extraction, Calculation of no. of stages for cross current flow.	Chap.13, T1

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid test	90 min	25	15/3 1.30 -3.00 PM	CB
Assignments -2	60 min	15		OB
Surprise Tests	-	20		CB/OB
Comprehensive Exam	3hr	40	11/05 FN	CB(20%)+OB(20%)

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Chamber Consultation Hour: To be announced in class

Notices: Notices will be put in CMS and Department of Chemical Engineering Notice Board

Make-up Policy: Granted only to **genuine cases** with prior permission from IC.

INSTRUCTOR-IN-CHARGE