BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
HYDERABAD CAMPUS FIRST SEMESTER 2023-24
Course Handout (Part II)

Date: 11/08/2023

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 F313**
***Course Title*:** **SEPARATION PROCESSES II**
Instructor-in-charge: Jaideep Chatterjee
Instructors: Ramendra Kishor Pal
Tutorial Instructors: Jaideep Chatterjee, Ramendra Kishor Pal

1. **Scope and Objective of the Course:**

This course deals with Chemical Engineering Unit Operations of

1. Humidification
2. Drying
3. Adsorption & Other Fixed Bed Separations
4. Membrane Separations (Molecular)
5. Crystallization
6. Mechanical Separations (Settling, Centrifugation, Screening), Filtration
7. Unit Operations involving Powders & Granules.

These Unit operations are common to many industrial processes. Each of these processes is classified according to its function without regard to the industry.

2. **Text Book:**

(i) McCabe W. L., Smith J. M., Harriott P., *Unit Operations of Chemical Engineering*, 7th Edition., McGraw-Hill International Edition, 2005.

3. **Reference Books:**

R1 *Chemical Engineering* (Volumes 1-6), Coulson J. M., Richardson J. F. & others, Pergamon Press, London, 1978 & 1997.
R2 *Principles of Unit Operations*, Foust A. N. & others, 2nd Edition, John Wiley & Sons, 1980.
R3 *Mechanical Operations*, Anup K Swain, H Patra, and GK ROY.
R4 *Principles of Mass Transfer and Separation Processes*, Binay K. Dutta, PHI Learning Pvt. Limited, 2007

4. Course Plan:

Lect. No.	Learning Objectives	Topics to be covered	Ref. Chapter of Text Book
1-5	Through understanding of Humidification and its applications	Humidification Definitions, Humidity Charts, Wet-Bulb Temperature, Cooling Towers	C19 of TB
6-11	Through understanding of Industrial Drying and its applications	Principles & applications of Drying, Cross circulation & Through Circulation Drying, Freeze drying, Drying Equipment	C24 of TB

12-18	Through understanding of Adsorption and other Fixed Bed Separations	Adsorption Equilibria, Adsorption Process Design, Ion-Exchange Systems, Chromatography Columns	C25 of TB
19-24	Through understanding of Membrane Separations	Gas separations, Liquid separations, Reverse Osmosis and Pervaporation	C26 of TB
25-27	Crystallization	Fundamentals, Nucleation and Crystal Growth, Yield estimation, Equipment Design	C27 of TB, C13 of R4
28-32	Unit Operations with Powders	Characterization of Powders, Storage and conveying of powders, Mixing of Solids, Size Reduction Processes & Equipment, Ultrafine Grinders	C28 of TB, C2, C3, C9 of R3
33-37	Mechanical Separations: Settling & Screening	Mechanical Screening, Gravitational Settling, Centrifugal Screening	C29 of TB, C4, C5 of R3
38-42	Mechanical Separations: Filtration	Cake Filtrations, Membrane filtrations such as Ultra and Microfiltration, Clarification & Depth Filtration	C29 of TB, C6 of R3

5. Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Remarks
Class Test 1	50 min	15 %	Before Mid-Sem	Open Book OB
Mid Semester Exam	90 min	30 %	09/10 - 4.00 - 5.30PM	OB
Class Test 2	50 min	15 %	After Mid-Sem	OB
Comprehensive Exam.	3 hours	40 %	07/12 AN	OB

6. **Chamber Consultation Hour**: To be announced in the class.

7. **Notices**: All notices concerning this course will be in the CMS system or via email.

8. **Make-up Policy**: Make-up may be granted only with prior permission for valid reasons at the discretion of the Instructor-in-charge.

9. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester, and violations will be punished.

Jaideep Chatterjee
Instructor-in-charge
CHE F313