

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**  
**HYDERABAD CAMPUS**  
**FIRST SEMESTER 2019-20**  
**Course Handout (Part II)**

**01/08/2019**

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 F313  
**Course Title** : SEPARATION PROCESSES II  
**Instructor-in-charge** : D.PURNIMA

**Tutorial Instructors** : D.PURNIMA

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

This course deals with chemical engineering operations such as size reduction, mechanical separation, filtration, crystallization, drying, adsorption, membrane separation process etc. There are many physical operations that are common to many industrial processes. Each of these processes is classified according to their function without regard to the industry. Each such operation is studied as a unit operation. Some selected unit operations are dealt with in this course.

**2. Text Book:**

(i) McCabe W. L., and Smith J. M., & Harriott P., *Unit Operations of Chemical Engineering*, Seventh 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 *Unit Operations*, Brown G. G. & others, Chapman & Hall, 1950.

R4 *Chemical Engineers Handbook*, Perry, R. H. (Ed.), McGraw-Hill, New York (all editions).

**4. Course Plan:**

Lect. No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1.	Properties and Handling of particulate solids	Characterization of Solid particles, properties of masses of particles	Ch. 28 (TB)
2	-do-	Storage and conveying of solids, mixing of solids	Ch. 28 (TB)
3	-do-	Mixers for cohesive/non-cohesive solids	Ch. 28 (TB)
4	-do-	Size reduction, equipment for size Reduction, Ultrafine grinders	Ch. 28 (TB)
5	Mechanical separation	Screening, screening equipment	Ch. 29 (TB)
6-7	-do-	Filtration equipment	Ch. 29 (TB)
8-9	-do-	Filtration calculations	Ch. 29 (TB)
10-11	-do-	Membrane filtration, gravity settling processes	Ch. 29 (TB)
12	-do-	Centrifugal sedimentation processes	Ch. 29 (TB)
13-14	Drying of Solids	Principles of Drying	Ch. 24 (TB)

15-16	-do-	Cross circulation drying	Ch. 24 (TB)
17-18	-do-	Through circulation drying, Freeze drying, Drying equipment	Ch. 24 (TB)
19-20	Fixed Bed separation	Adsorption	Ch. 25 (TB)
21-22	-do-	Ion-exchange	Ch. 25 (TB)
23-25	-do-	Chromatography	Ch. 25 (TB)
26-28	Membrane separation	Separation of gases	Ch. 26(TB)
29-31	-do-	Separation of liquids	Ch. 26 (TB)
32-33	Crystallization	Introduction, Crystal geometry, Equilibria, Super saturation	Ch. 27 (TB)
34-37	-do-	Nucleation, Crystal growth and crystallization equipment	Ch. 27 (TB)
38	-do-	Crystallizer design and crystallization from melts	Ch. 27(TB)
39-40	Humidification	Humidity chart, Wet-bulb temperature and Cooling towers	Ch. 19(TB)
41-42	Laboratory Visit	Mass transfer equipment demonstration	

#### 5. Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Nature of component
Mid test	90 min	25%	1/10, 3.30 -- 5.00 PM	CB
Quiz*		10%		CB
Seminar/Term paper		20 %		OB
Comprehensive Exam.	3 hours	45%	7/12 AN	CB

\*No of quizzes will be announced in class

7. **Chamber Consultation Hour:** To be announced in the class. **(Chamber: D 203)**

8. **Notice:** Notice will be displayed on Chemical Engineering Notice Board (D block, first floor)

9. **Make-up policy:** Make-up will be granted after he /she maintains minimum attendance in the class and has genuine reasons not to appear in the regular test.

10.**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.

**Instructor-in-charge**  
**CHE F313**