**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**