

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI- HYDERABAD CAMPUS**  
**SECOND SEMESTER 2023-2024**  
**COURSE HANDOUT (PART II)**

**Date: 09.01.2024**

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

**Course No.** : **BITS F219**  
**Course Title** : **Process Engineering**  
**Instructor-in-charge** : **Professor. Swati Biswas**

### **1. Course Description:**

This course deals with pharmaceutical unit operations in the phytopharmaceutical, bulk drug, and formulation manufacturing industry. The processes and equipment used in unit operations include extraction, filtration, drying, evaporation, distillation, size reduction, size separation, size analysis, mixing, crystallization, compression, and consolidation of different pharmaceutical or phytopharmaceutical preparations.

### **2. Scope & Objective:**

The course's objective is to impart knowledge of different pharmaceutical unit operations used at various stages in the manufacture of different pharmaceutical or phytopharmaceutical products. The students will learn the processes and equipment used in each unit's operations, which helps them understand the critical process-related factors affecting the manufacture of different formulations. Laboratory sessions are designed to expose the students to the operation, handling, and processing of materials by various unit operations equipment.

**3. Learning Outcome:** The students will impart knowledge of different unit operations used in other pharmaceuticals' manufacturing processes. The students will gain hands-on experience working with some of the unit operations in the lab.

### **4. Text Book:**

1. Lachman, L., Lieberman, H., The Theory and Practice of Industrial Pharmacy, Lea-F, 3<sup>rd</sup> ed., 1986
2. Aulton M. E., Pharmaceutics: The Design of Manufacture of Medicine, Dosage form Design, Churchill Livingstone, 2<sup>nd</sup> Edition, 2002.

### **5. Reference Books:**

1. Rawlins, E.A., Bentley's Textbook of Pharmaceutics, ELBS, 8<sup>th</sup> Edition.
2. Carter, S.J. (Ed.), Cooper and Gunn's Tutorial Pharmacy, Kothari, Bombay, 6<sup>th</sup> Edition, 1972.
3. Pharmacopoeias of different countries: Indian Pharmacopoeia, British Pharmacopoeia, and United States Pharmacopoeia.

### **6. Course Plan:**

Lec. No.	Learning objective	Topics to be covered	Ref./chap./Sec.
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1	Introduction of Industrial Pharmacy	Industrial pharmacy: applications and operations	Class Notes
2-3	Decision and selection of materials of construction of equipment	Raw materials and materials of construction, selection of materials of construction, protection of equipment	Class Notes
4-6	Various aspects of extraction methods, mechanisms, factors, solution	Extraction of drugs from Sources	R1
7-9	Size reduction: science, methods, equipment, selection of methods	Comminution	T1- 2
10-12	Size separation, measurement	Micromeritics	T2-10,11,12
13-15	Mixing: science, techniques, and types of equipment selection	Mixing	T1-1, T2-13
16-17	Centrifugation: Principle, instruments, and application	Centrifugation	Class Notes
18-19	Distillation: operation application and equipment used	Distillation	R1-14
20-21	Evaporation: operation, application, and equipment used	Evaporation	T2-30
22-23	Drying: operation, equipment used	Drying	T1- 3, T2-26
24-25	Filtration: operation, application, and types of equipment used	Filtration	T1- 7, T2-22
26-28	Science of Technology of Compression	Compression and consolidation, crystallization	T1- 4

#### 7. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Remarks
Pre-Mid-term Surprise Quizzes	15 minX 2	5+5=10	In class	Closed book
Mid-semester Test	90 min	30	12/03 - 11.00 - 12.30PM	Closed book
Post-Mid-term surprise quiz	30 min	5	In class	Open book (5 %)
Seminar (post-mid sem)	5 min	5	In class	Open book (5 %)
Comprehensive Exam	180 min	35	09/05 FN	Open book (CB. 25 % +OB. 10 %)
Lab Component* (day-to-day performance, lab record, final comprehensive quiz)	-	5(OB)+5(OB)+5(CB)	In class	Open book (10 %)

\*CB: Closed book; OB: Open book

**8. Mid-semester evaluation:** This Will be announced after the 2<sup>nd</sup> test.

**9. Attendance:** Regularity in attendance will be one of the criteria in deciding the borderline cases at the time of final grading.

**10. Grading Procedure:**

- It is not necessary that all the five grades (i.e. A to E) would be awarded.
- In borderline cases, subjective judgment will be exercised for pull-ups (max. 2%). Essential guiding factors will be regularity, consistency in performance (above average), or/and steady improvement throughout the semester.

**11. Make-up:** Make-up will be given only for **genuine** reasons. It is expected that students shall only use this feature if it is extremely required.

**12. Chamber consultation hours:** To be announced in the class.

**13. Notices:** Notices about this course will be displayed **only on CMS and Google Classroom**.

**14. 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  
BITS F219**