

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI- HYDERABAD CAMPUS**  
**SECOND SEMESTER 2019-2020**  
**COURSE HANDOUT (PART II)**

**Date: 06.01.2020**

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

<b>Course No.</b>	<b>:</b>	<b>BITS F219</b>
<b>Course Title</b>	<b>:</b>	<b>Process Engineering</b>
<b>Instructor-in-charge</b>	<b>:</b>	<b>Swati Biswas</b>
<b>Instructors</b>	<b>:</b>	<b>Kumbham Soniya, Milan Pal</b>

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

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

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

The objective of the course is to impart knowledge on different pharmaceutical unit operations which are used at various stages in the manufacture of different pharmaceutical or phyto-pharmaceutical products. The students will gain knowledge on the processes and equipment used in each of the unit operations which help them understand the critical process related factors affecting the manufacture of different types of 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 on different unit operations, which are used in different stages of manufacturing process of pharmaceuticals. The students will gain hands on experience on working with some of the unit operations in the lab as well.

### **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:**

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

**7. Evaluation Scheme:**

<b>Component</b>	<b>Duration</b>	<b>Weightage (%)</b>	<b>Date &amp; Time</b>	<b>Nature of Component</b>
Pre-Mid-term Surprise Quiz	30 min	10	In class	CB
Mid-semester Test	90 min	20	2/3 3.30 - 5.00 PM	CB
Post-Mid-term surprise quiz	30 min	10	In class	CB
Seminar	8 min	5	Will be announced in the Class	OB
Comprehensive Exam	180 min	35	02/05 AN	CB (20 %) OB (15 %)
Lab Component*	-	20		OB (10 %) CB (10 %)

Sincerity and record: 10 % , Final lab quiz: 10 %

**8. Mid-semester evaluation:** 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%). Basic 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 avoid misuse of this feature.

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

**13. Notices:** Notices pertaining to this course will be displayed **only on Pharmacy Department Notice Board**.

**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**