PANIPAT INSTITUTE OF ENGINEERING AND TECHNOLOGY, PANIPAT

DEPARTMENT OF PHARMACY

Course: Bachelor in Pharmacy

LESSON PLAN

Faculty Name: Dr. Sonia Narwal **Subject Name: Pharmaceutical Engineering**

Class: B. Pharmacy –3rd Semester **Subject Code: 304T**

Scope: This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.

Course outcome: Upon completion of the course student shall be able:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Number of Lectures: 45 **Each lecture**: 01 hour

S.No.	Particular	Remark/Date
Unit 1: Flow of fluids, Size Reduction, Size Separation:		
1.	Types of manometers, Reynolds number and its significance	
2.	Bernoulli's theorem and its applications, Energy losses	
3.	Orifice meter, Venturimeter, Pitot tube and Rotometer	
4.	Objectives, Mechanisms & Laws governing size reduction	
5.	Hammer mill, ball mill, fluid energy mill	
6.	Edge runner mill & end runner mill	
7.	Objectives, applications & mechanism of size separation	
8.	official standards of powders, sieves, size separation	
9.	Sieve shaker, cyclone separator	
10.	Air separator, Bag filter & elutriation tank.	
Unit 2: Heat Transfer, Evaporation, Distillation		
11.	Objectives, applications and factors influencing evaporation	
12.	Steam jacketed kettle, horizontal tube evaporator, climbing film	
13.	Forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator.	
14.	Basic Principles and methodology of simple distillation, flash distillation, fractional distillation	
15.	Distillation under reduced pressure, steam distillation & molecular distillation	
Unit 3: Drying, Mixing		
16.	Objectives, applications & mechanism of drying process, Equilibrium Moisture content, rate of drying curve.	

17.	Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.	
Unit 4: Filtration, Centifugation		
18.	Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias.	
19.	Plate & frame filter, filter leaf, rotary drum filter, Meta filter	
20.	Cartridge filter, membrane filters and Seidtz filter.	
21.	Objectives, principle & applications of Centrifugation	
22.	Perforated basket centrifuge, Non-perforated basket centrifuge,	
23.	Semi continuous centrifuge & super centrifuge.	
Unit 5: Materials of pharmaceutical plant construction, Corrosion and its prevention		
24.	Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion	
25.	Types of corrosion and there prevention	
26.	Ferrous and nonferrous metals, inorganic and organic non metals	
27.	Basic of material handling systems.	

Teacher in-charge **Principal**