

## **BASIC ENGINEERING - I** **(Unit Operations – I)**

**PH.3.3            THEORY**

**3 hours/ week**

### **UNIT -I**

1.    **Heat Transfer:** Heat transfer, overall heat transfer coefficient, sources of heat, steam and electricity as heating media, determination of requirement of amount of steam/ electrical energy, steam pressure, heat exchangers.
  
2.    **Drying:** Moisture content and mechanism of drying, rate of drying and time of drying calculations. Classification and types of dryers, dryers used in pharmaceutical industries and special drying methods.

### **UNIT -II**

3.    **Size Reduction and Size Separation:** Definition, objectives of size reduction and size separation, factors affecting size reduction, laws governing energy and power requirements of mills including ball mill, hammer mill, fluid energy mill , sieve analysis, standards of sieves, size separation equipment shaking and vibrating screens, gyratory screens, cyclone separator, air separator, bag filters, cottrell precipitator, scrubbers, size separators basing on sedimentation theory.

### **UNIT -III**

4.    **Mixing and Homogenization:** Theory of mixing, mixing efficiency, solid-solid, solid-liquid and liquid-liquid mixing equipments, homogenizers.
  
5.    **Evaporation:** Basic concept of phase equilibria, factors affecting evaporation, evaporators, film evaporator, single effect and multiple effect evaporator.

### **UNIT -IV**

6.    **Distillation:** Raoult's law, phase diagrams, volatility, simple, steam and flash distillations, principles of rectification, Mc cabe Thiel method for calculation of number of theoretical plates, Azeotropic and extractive distillation.
  
7.    **Filtration:** Theory of filtration, filter aids, filter media, industrial filters including filter press, rotary filter, edge filter. Factors affecting filtration, optimum cleaning cycle on batch filters.