

3. Explain rate of drying curve. Write the principle, construction, working, uses, advantages and disadvantages of Lyophilizer. (3+7)

**III. Short answers (Answer seven out of nine questions)**

5x7=35

1. Explain Bernoulli's theorem and mention its applications. (4+1)
2. Write the official standards of powders and sieves. (2+3)
3. State and explain Fourier's law of heat transfer. Write the difference between heat interchangers and heat exchangers. (4+1)
4. Write the principle and methodology of simple distillation process used for the preparation of water for injection. (2+3)
5. Explain the mechanism of solid mixing. Discuss the working of Planetary mixer. (3+2)
6. Write the principle, construction, working, uses of Silverson emulsifier. (5)
7. Describe the principle, construction, working, uses and merits of Rotary drum filter. (5)
8. Explain the principle of centrifugation. Discuss the construction and working of Super-centrifuge. (2+3)
9. Write any five methods to prevent corrosion of materials used in pharmaceutical plant construction. (5)

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2023/SEM/ODD/BP-304T/007

**UG Odd Semester (CBCS) Examination, March 2023**

**PHARMACEUTICAL SCIENCES**

(3<sup>rd</sup> Semester)

**Course No: BP 304T**

**(Pharmaceutical Engineering-Theory)**

Full Marks: 75

Time: 3 Hours

*The figures in the margin indicate full marks for the questions*

**I (A). Multiple choice questions** **1x10=10**

- (a) Which equation is used to calculate frictional loss when a liquid flows through a pipe?
  - (i) Darcy's equation
  - (ii) Fanning equation
  - (iii) Kozeny-Carman equation
  - (iv) Bernoulli's equation
- (b) Which equipment has agitation as the mechanism of size separation?
  - (i) Sieve shaker
  - (ii) Cyclone separator
  - (iii) Elutriation tank
  - (iv) Sedimentation tank
- (c) Counter-current means of heat transfer is seen in the --- heater.
  - (i) Tubular heater
  - (ii) Multipass heater

*(Turn Over)*

- (iii) Floating head two-pass heater
- (iv) Double pipe heat interchanger
- (d) The most suitable distillation method used for the separation of the highly viscous liquid mixture?
  - (i) Molecular distillation
  - (ii) Flash distillation
  - (iii) Steam distillation
  - (iv) Distillation under reduced pressure
- (e) Which filter is containing a membrane filter?
  - (i) Leaf filter
  - (ii) Cartridge filter
  - (iii) Metafilter
  - (iv) Plate and frame filter
- (f) Which dryer cannot be used for the solution containing non-aqueous solution?
  - (i) Spray dryer
  - (ii) Rotary dryer
  - (iii) Tray dryer
  - (iv) Freeze dryer
- (g) The phenomenon noticed during the mixing of micronized sodium bicarbonate with sucrose crystal is –
  - (i) Perfect mixing
  - (ii) Random mixing
  - (iii) Ordered mixing
  - (iv) Segregation
- (h) Brittle material best fractured by --- grinder?
  - (i) Ball mill
  - (ii) Hammer mill
  - (iii) Fluid energy mill
  - (iv) Cutter mill

- (i) The type of corrosion is seen when austenitic stainless steel reacts with nitric acid?
  - (i) Intergranular
  - (ii) Pitting
  - (iii) Dezincification
  - (iv) Cavitation
- (j) Which type of Glass is used to pack non-parenteral formulations?
  - (a) Type I
  - (b) Type II
  - (c) Type III
  - (d) Type IV

**I (B). Objective type (Answer the following in brief)**

2x5=10

- (a) What is Reynolds number?
- (b) Mention and define the low governing radiation mode of heat transfer.
- (c) Define loss on drying (LOD) and equilibrium moisture content (EMC).
- (d) What is the mixing index?
- (e) List out factors affecting the selection of materials for pharmaceutical plant construction.

**II. Long answers (Answer two out of three questions)**

10x2=20

1. Explain the Laws governing size reduction. Write the principle, construction, working, uses, merits and demerits of Ultrafine grinders with a neat labelled diagram. (3+7)
2. Discuss the factors influencing evaporation. Write the principle, construction, working, uses, and merits of climbing film evaporator. (4+6)