

B.Pharm First Semester Examination June-2012  
030020103 Pharmaceutical Engineering

**Instructions:**

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.
5. Draw diagrams/figures wherever necessary.

**Q-1 (A) Do as directed: (07)**

- I. Convert 40 PSI to  $\text{gm/cm}^2$ .
- II. Comment: In stationary fluid, velocity pressure will be zero.
- III. Write limitation of Poiseuille's law.
- IV. Define Tie substance.
- V. Comment: Unit process involves only physical changes, where as Unit operation deals with physical changes along with chemical changes in process.
- VI. Differentiate: Dimensional equation – Dimensionless equation
- VII. Write Fanning's equation.

**Q-1 (B) Answer the following in brief: (Any 4) (08)**

- I) Define (i) Turbulant flow (ii) Streamline flow
- II) Define the following terms: (i) Unit operations (ii) Dimensional equation
- III) Give two characteristics of Bingham bodies.
- IV) Discuss energy loss due to sudden contraction.
- V) Define stoichiometry. Give significance of “stoichiometry” in pharmacy field.
- VI) Convert the following:
  - a. 350 lit/min volumetric flow rate to mass flow rate (kg/hr) considering density of fluid to be 1g/cm<sup>3</sup>.
  - b. 13 g/cm<sup>3</sup>.hr to kg/m<sup>3</sup>.sec

**Q-2 Answer the following: (10)**

- A) Write the principle, construction, equation and applications of Venturimeter with labelled diagram.

A) Compare and contrast venturimeter and orifice meter.

B) A salt solution originally contains 4% by weight NaCl in water evaporated to 5% by weight NaCl. Calculate: % of water evaporated and % reduction in original solution?

B) In continuous process of 100 Lb of wet air containing 0.02 lb of water vapour per Lb of dry air enter per minute in a humidifier, where water vapour is added to the air. The leaving air contains 0.05 Lb of water vapour per Lb of dry air. Calculate the kg of water added to the initial wet air per minute.

- Q-3**                      **Answer the following in detail: (Any 2)**                      **(10)**
- A) What is the significance of Reynold' number? Is it dimensionless? Justify your answer.
  - B) Describe principle and working of rotameter with labeled diagram,.
  - C) Explain overall material balance and individual material balance theory with suitable example.

**Section-II**

- Q-4 (A)**                      **Do as directed:**                      **(07)**
- I) Define: Convection.
  - II) Give the two names of metal used for prevention of chromium depletion.
  - III) Enumerate problems associated with glass.
  - IV) Write the equation governing solid-fluid mass transfer.
  - V) Define individual film coefficient.
  - VI) Give one example of each method of heat transfer.

- Q-4 (B)**                      **Answer the following in brief: (Any 4)**                      **(08)**
- I) Describe the steel alloys used in pharmacy practice.
  - II) Write the advantages of steam used as heating medium.
  - III) State the conditions for using arithmetic mean area and log arithmetic mean area for calculating the rate of heat transfer. Also write the equations for both.
  - IV) Comment: counter-current flow is better than co-current flow for an efficient heat transfer.
  - V) What is the effect of elevated temperature on mass transfer?
  - VI) Enlist various boundary layers that offer a resistance to convection.

- Q-5**                      **Answer the following:**                      **(10)**
- A) Discuss in detail the role of stainless steel in the pharmaceutical industry.

**OR**

- A) Explain over all heat transfer coefficient U. Taking simple example of steam condenser, derive the equation for U.
- B) How will you use mean area and mean temperature for calculating rate of heat transfer? Derive the mathematical equation to explain the concept of mean area and mean temperature.

**OR**

- B) Classify materials used for pharmaceutical plant construction. Explain corrosion.

- Q-6**                      **Answer the following in detail: (Any 2)**                      **(10)**
- I. Write a note on Stainless steel as a material for pharmaceutical plant construction..
  - II. Write the factor affecting selection of material of pharmaceutical plant construction.
  - III. Explain with diagram resistances "In series" and "In parallel" and derive the equations for both.