

**UKA TARSADIA UNIVERSITY**

**B.Pharm. (1st Semester)**

**Subject :030020103-Pharmaceutical Engineering**

**Duration : 3 Hours**

**Max. Marks : 70.**

**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 allocated to that question.
5. Draw diagrams/figures whenever necessary.

**SECTION - 1**

**Q-1 (A) Do as directed.**

**[07]**

- I) Convert  $3\text{g/cm}^3$  to  $\text{lb/ft}^3$ .
- II) Define Stoichiometry.
- III) Define Viscosity and write its units.
- IV) Comment: Unit process involves only physical changes, where as Unit operation deals with physical changes along with chemical changes in process.
- V) Explain Vena contracta.
- VI) Write Fanning's equation.
- VII) Write MKS and SI units of pressure.

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

**[08]**

- I) Discuss the importance of Pharmaceutical engineering.
- II) Explain any two types of graphical representations.
- III) State Avogadro's law of gases.
- IV) Differentiate Newtonian and Non-Newtonian systems.
- V) Write limitation of Poiseuille's law.
- VI) What do you mean by Specific heat.

**Q-2 Answer the following.**

**[10]**

- A) A mercury manometer is connected across a venturimeter. The pressure on upstream-side ( $P_1$ ) is  $0.5\text{ kg/cm}^2$  gauge. The manometer reading  $\Delta P$  is  $70\text{ mmHg}$ . The fluid is water. Calculate the pressure at throat  $P_2$ .

**OR**

- A) Prove Raynolds number is dimensionless and explain mechanism of fluid flow.
- B) A moist paper containing 20% water by weight goes in a dryer in a continuous process. The paper leaves the drier containing 2% water by weight. Calculate the weight of water removed from the paper per 100 kg of the original moist paper. Calculate using the principle of material balance.

**OR**

- B) Write a note on Limekiln Performance.

**Q-3 Answer the following in detail. (Any 2)**

**[10]**

- A) Compare and contrast Orifice meter and Ventury meter.
- B) What is tie substance? Briefly explain the principle of material balance taking example of a tie substance.
- C) Describe mechanism, working and applications of Rotameter with proper diagram.

**SECTION - 2**

**Q-4 (A) Do as directed.**

**[07]**

- I) Define black body.
- II) Define: Conduction.
- III) Give one example of convection and radiation.
- IV) Mention components of fluid transport.
- V) What do you mean by mass transfer?
- VI) What is leaching?
- VII) Write the equation governing solid-fluid mass transfer.

**Q-4 (B) Answer the following in brief. (Any 4)**

**[08]**

- I) Explain latent heat.
- II) Write the composition of glass.
- III) State and explain Stephen Boltzmann's Law.
- IV) Write advantages of plastic.
- V) What are the different types of valve?
- VI) What is the effect of elevated temperature on mass transfer?

**Q-5 Answer the following.**

**[10]**

- A) Write Fourier's law. Derive an equation for rate of heat transfer when the resistances are in parallel.

**OR**

- A) Enumerate the various modes of heat transfer. Differentiate between them with examples.
- B) Define corrosion. Write a note on factors affecting the corrosion.

**OR**

- B) Write a note on principle of mass transfer.

**Q-6 Answer the following in detail. (Any 2)**

**[10]**

- A) Write a note on Stainless steel as a material for pharmaceutical plant construction.
- B) Write about the gas handling system.
- C) Write influences of mass transfer on unit operations.