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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Food Technology) (Sem.-3)
FLUID FLOW OPERATIONS AND RHEOLOGY

Subject Code : BTFT-304

M.Code : 76992

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Write briefly :**

- a) Define Dynamic and Kinematic viscosity. Mention its SI units.
- b) Differentiate between compressible fluids and incompressible fluids.
- c) Define Potential flow and fully developed flow.
- d) What is vena-contracta?
- e) Differentiate between Newtonian and non- Newtonian fluids.
- f) Briefly explain memory fluids with examples.
- g) What is apparent viscosity?
- h) Briefly explain Reynolds number. Give its significance.
- i) Give the formula for energy loss due to sudden enlargement. Explain its terms.
- j) What are Herchel- Bulkley fluids?

SECTION-B

2. Derive Bernoulli equation for incompressible fluids. State its assumptions.
3.
 - a) Calculate the friction factor when the Reynold number is 1800 for a flow of fluid through pipe.
 - b) Water of density 1000 kg/m^3 and viscosity 0.0008 (N.s)/m^2 is pumped at $1000 \text{ cm}^3/\text{s}$ through a 25 mm i.d. pipe. Calculate the value of Reynolds number.

4. What are positive displacement pumps? Write a note on the construction and working of gear and lobe pumps.
5. Describe various oscillatory methods for the measurement of fluid properties.
6. The water (having density 1000 kg/m^3) discharge through a horizontal pipe of diameter 80 mm is 20 liter/sec. The pressure drop due to friction per 10 m of pipe is 50 kN/m^2 . Find the values of Darcy's friction factor and Fanning friction factor. Also calculate the power loss due to fluid friction.

SECTION-C

7. Differentiate between time dependent and time independent fluids. Explain the behavior of power law fluids using stress strain diagram and mathematical relations. Give suitable examples for each type. (10)
8. a) Derive an expression for discharge through a venturimeter. (5)
b) The liquid having specific gravity 0.8 is flowing through an inclined venturimeter in the upward direction. The inlet and throat diameters of the venturimeter are 200 mm and 100 mm respectively. The length between inlet and throat is 500 mm and the venturimeter is inclined at an angle of 60° with horizontal. Find the discharge through venturimeter if :
 - i) The pressure of the inlet is 19.62 N/cm^2 (gauge) and at the throat is 3.924 N/m^2 (vacuum)
 - ii) The mercury differential manometer gives a reading of 30 cm. Take coefficient of discharge as 0.98. (5)
9. a) Write notes on the following : (3 × 2)
 - i) Ostwald viscometer
 - ii) Oscillatory measurements methodb) A capillary tube of diameter 2 mm and length 100 mm is used for measuring the viscosity of the liquid. The difference of pressure between the two ends of the tube is 0.6867 N/cm^2 and the viscosity of the liquid is 0.25 poise. Find the rate of flow of liquid through the tube. (4)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.