

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018****Subject Code:2153612****Date:11/12/2018****Subject Name:Basics of Fluid Flow****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Mention newton's law of viscosity. Give the classification of fluids based on Newton's law of viscosity.	03
	(b) Describe any four properties of fluids with their units.	04
	(c) The surface area of a moving plate is 2 m^2 which is moving at a velocity of 0.6 m/s . the distance between fixed plate and moving plate is 0.2 mm . Viscosity of fluid is 0.1 Ns/m^2 . Determine the shear stress, and power required to maintain velocity of plate.	07
Q.2	(a) Why water is not used as a manometric fluid in Manometers?	03
	(b) Write a short note on various pressure measurement scales?	04
	(c) Find the depth of oil of specific gravity of 0.82 which produces an intensity of pressure equal to 2.5 kN/m^2 . Also find the pressure head in terms of water and mercury.	07
	OR	
	(c) Discuss how a U-tube differential manometer can be used to measure pressure difference in a pipe.	07
Q.3	(a) Explain (i) Laminar flow (ii) Turbulent flow (iii) Unsteady flow	03
	(b) Briefly discuss formation of boundary layer in tubes mentioning transition length.	04
	(c) Water is flowing through a pipe of 7-mm diameter under a pressure of 50 kPa and with a velocity of 3 m/sec . neglecting friction find the total head if the pipe is 10 m above the datum line.	07
	OR	
Q.3	(a) Differentiate streamline and streamtube.	03
	(b) Water is flowing through a pipe of inside diameter 50 mm with a volumetric flow rate of $0.00063 \text{ m}^3/\text{sec}$. Calculate mass flow rate and mass velocity of water.	04
	(c) Mention the various representational forms of Bernoulli's equation interpreting the physical significance of each of them.	07
Q.4	(a) Discuss static dynamic and total head with respect to pitot tube	03
	(b) Derive the equation of discharge of flow through venturimeter.	04
	(c) A fluid of density 900 kg/m^3 and viscosity 0.005 Ns/m^2 is flowing through a pipe of 0.4 m diameter and 900 m long. If the volumetric flow rate of fluid is $0.33 \text{ m}^3/\text{s}$. Determine the head lost due to friction and power required to pump the fluid	07
	OR	
Q.4	(a) Mention the various heads in a pump.	03
	(b) Describe various hydraulic coefficients of orifice. Mention relationship between them.	04
	(c) Determine the head lost due to friction for the flow of water through a pipe of 30 cm diameter and 60 m long. The volumetric flow rate of water is $0.15 \text{ m}^3/\text{sec}$?	07

- Q.5 (a) Describe about flow pattern in agitated vessels **03**
 (b) A Flat blade turbine with six blades is installed centrally in a tank. **04**
 The tank is 1.83 m in diameter with turbine 0.61m and positioned 0.61m from the bottom of the tank. The turbine blades are 127mm wide. The tank is filled up to a depth of 1.83 m with a solution of 50% caustic soda at 65.6 °C having a viscosity of 12 cp having a density of 1498 kg/m³. The turbine is operated at 90 rpm. The tank is baffled. Estimate Reynolds number and power requirement to operate the mixer?
 (Take value of Power number = 6 for calculations)
 (c) Describe the various kinds of agitation equipments used in process industries. **07**

OR

- Q.5 (a) Explain the correlation between form drag and streamlining **03**
 (b) A sand particle having an average diameter of 1mm has a specific gravity of 2.1. Determine the terminal settling velocity and Reynolds number of the particle settling in water at a temperature of 20 °C. **04**
 (c) What is fluidization? Derive an expression for minimum fluidization velocity from first principles. **07**

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