

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- V (New) EXAMINATION – WINTER 2019

Subject Code: 2153612

Date: 02/12/2019

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 four important properties of fluid with their corresponding units.	03
	(b) What is meant by Potential flow. Specify its characteristics.	04
	(c) The dynamic viscosity of an oil used for lubrication between shaft and a sleeve is 6 poise. The shaft is of diameter 0.4m and rotates at 190 rpm. Calculate power lost in bearing for a sleeve length of 90mm. The thickness of oil film is 1.5mm.	07
Q.2	(a) List the conditions of equilibrium of a floating body.	03
	(b) Write a short note on different pressure measurement scales	04
	(c) Find the density of a metallic body which floats at interface of mercury of specific gravity 13.6 and water such that 40% of its volume is submerged in water.	07
	OR	
	(c) The diameter of a pipe at sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if velocity of water flowing through pipe at section 1 is 5 m/s. Determine the velocity at section 2.	07
Q.3	(a) Explain the terms (i) Reynolds number (ii) Mass velocity (iii) Transition length	03
	(b) Differentiate Streamlines and Streamtubes.	04
	(c) Write the three representational forms of Bernoulli's equation relating to flow of fluid between two points in an incompressible fluid.	07
	OR	
Q.3	(a) How flow measurement is quantified in case of non-circular cross sections?	03
	(b) Mention the correction factors included in Bernoulli's equation to account for flow in practical situations.	04
	(c) At a certain section A of a pipe line carrying water the diameter is 1m, the pressure is 98.1 kN/m ² and the velocity is 3 m/sec. At another section B, which is 2m higher than section A, the diameter is 0.7m and the pressure is 59.2 kN/m ² . What is the direction of flow?	07
Q.4	(a) What is understood by a Hydraulically smooth pipe?	03
	(b) With a neat diagram explain the working principle of rotameter.	04
	(c) Derive Hagen Poiseuille's equation for the flow of incompressible fluid in laminar regime through a pipe	07
	OR	
Q.4	(a) A pitot tube is used to measure velocity of water in a pipe. The stagnation pressure head is 6m and static pressure head is 5m. Calculate the velocity of flow assuming coefficient of tube as 0.98.	03
	(b) Mention the various form frictional losses for the flow of fluid through a pipe.	04
	(c) Water is flowing through a pipe of diameter 30 cm and length 60m connected to the base of a tank. The water level in tank is 5m above centerline of pipe. Considering friction factor $f = 0.006$, Determine volumetric flow rate of water.	07
Q.5	(a) Differentiate positive displacement and centrifugal pipes.	03

- (b) Discuss various types of impellers used in industries. **04**
(c) With the help of a neat diagram explain various heads in a pump. **07**

OR

- Q.5** (a) What is terminal settling velocity? Mention the regime in which a particle settles under such conditions. **03**
(b) Write a short note on flow patterns in agitated vessels. **04**
(c) Derive an expression for minimum fluidization velocity for flow of fluid through a packed bed considering pressure drop per unit length of bed. **07**

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