

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-IV(NEW) – EXAMINATION – SUMMER 2019****Subject Code:2141906****Date:15/05/2019****Subject Name: Fluid Mechanics****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

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

		MARKS
<b>Q.1</b>	(a) Sketch the velocity distribution and shear stress distribution across a section of the pipe for laminar flow.	<b>03</b>
	(b) Distinguish between: 1. Rotational and Irrotational flow 2. Laminar and Turbulent flow	<b>04</b>
	(c) Explain bellow type pressure gauge.	<b>07</b>
<b>Q.2</b>	(a) Differentiate between (i) absolute and gauge pressure (ii) simple and differential manometer	<b>03</b>
	(b) Explain the following terms: 1. Relative density 2. Kinematic viscosity 3. Cavitation 4. Vapour pressure	<b>04</b>
	(c) Explain geometric similarity, kinematic similarity and dynamic similarity.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(c) Explain pressure diagram for inclined and submerge surface.	<b>07</b>
	(a) Explain one, two and three dimensional flow.	<b>03</b>
	(b) The space between two parallel plates 5 mm apart is filled with crude oil. A force of 2 N is required to drag the upper plate at a constant velocity of 0.8 m/s. the lower plate is stationary. The area of the upper plate is 0.09 m <sup>2</sup> . Determine (1) the dynamic viscosity and (2) the kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.9.	<b>04</b>
(c) Derive an equation for continuity equation for 3D flow and reduce it for steady, incompressible 2D flow.	<b>07</b>	
<b>OR</b>		
<b>Q.3</b>	(a) Explain the term Vorticity.	<b>03</b>
	(b) Obtain Darcy-Weisbach formula for head loss due to friction.	<b>04</b>
	(c) A solid cylinder 2 m in diameter and 2 m high is floating in water with its axis vertical. If the specific gravity of the material of cylinder is 0.65. Find its metacentric height. State also whether equilibrium is stable or unstable.	<b>07</b>
<b>Q.4</b>	(a) Explain stability of a floating body.	<b>03</b>
	(b) A horizontal venturimeter with inlet diameter 200 mm and throat diameter 100 mm is used to measure the flow of water. The reading of the differential manometer connected to the inlet is 180 mm of mercury. If the co-efficient of discharge is 0.98. Determine the rate of flow.	<b>04</b>
	(c) Deduce the expression of discharge over a rectangular notch.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) What do you understand by frictional resistance offered by pipe?	<b>03</b>
	(b) Water flows at the rate of 0.015 m <sup>3</sup> /s through a 100 mm diameter orifice used in a 200 mm pipe. What is the difference in pressure head between the upstream section and venacontracta section? Take co-efficient of contraction C <sub>c</sub> =0.6 and C <sub>v</sub> =1.	<b>04</b>

- (c) Derive Euler's equation of motion for flow along a stream line. Obtain Bernoulli's from it. State assumptions clearly. **07**

- Q.5** (a) Compare rectangular and triangular notches. **03**  
(b) Explain propagation of sound waves for Sub sonic and Sonic flow. **04**  
(c) The resistance force R of a supersonic plane during flight can be considered as dependent upon the length of the aircraft l, velocity V, air viscosity  $\mu$ , air density  $\rho$  and bulk modulus of air k. explain the functional relationship between the variables and the resisting force. **07**

**OR**

- Q.5** (a) State the momentum correction factor and list the momentum correction factor for different flow in pipes. **03**  
(b) Explain Reynold's experiment with neat sketch. **04**  
(c) Prove that the velocity of sound wave in compressible fluid is given by  $C = \sqrt{k\rho}$  **07**

\*\*\*\*\*