GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– V (New) EXAMINATION – WINTER 2019

Subject Code: 2153507   **Date: 02/12/2019**

Subject Name: Elements 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)**	Define Buckingham's pi theorem?	**03**
	(b)	What is the relationship between absolute, atmospheric and gauge pressure?	**04**
	(c)	Mention the physical significance of Reynolds number. Calculate the Reynolds number for flow for water flowing at 20°C in a pipe of 40 mm ID at the rate of 500 kg/min	**07**
Q.2	**(a)**	What is Newton's law of Viscosity?	**03**
	(b)	Explain Hydrodynamic Boundary layer.	**04**
	(c)	Differentiate laminar and turbulent flow	**07**
		OR	
	(c)	Discuss friction loss from sudden expansion and sudden expansion of cross section of pipe through which incompressible fluid is flowing.	**07**
Q.3	**(a)**	Mention the different types of notches with the specific applications where they are utilized.	**03**
	(b)	What is drag? Mention the case of drag on a flat plate when it is aligned parallel to the direction of flow of fluid.	**04**
	(c)	Write the various representational forms of Bernoullis equation with corresponding statements and units	**07**
		OR	
Q.3	**(a)**	What is meant by sub sonic and supersonic flow?	**03**
	(b)	How U tube manometer is used to measure pressure difference across a pipe?	**04**
	(c)	Explain Buckingham Pi theorem with an example for dimensional analysis	**07**
Q.4	**(a)**	What is meant by streamlines? How it is different from streamtubes?	**03**
	(b)	Discuss the different states of equilibrium regarding the stability of floating bodies	**04**
	(c)	Derive the equation of discharge for Venturimeter.	**07**
		OR	
Q.4	**(a)**	What is static head, dynamic head & total head?	**03**
	(b)	Describe different hydraulic coefficients of Orifice. Develop a relationship between them.	**04**
	(c)	Water is flowing through a pipe of 80mm diameter under a gauge pressure of 60 kPa with a mean velocity of 2m/s. Neglecting friction find the total head if the pipe is 7m above datum line.	**07**
Q.5	**(a)**	Describe any three properties of fluids with their respective units.	**03**
	(b)	Write about (i) Steady flow (ii) Unsteady flow (iii) Compressible flow (iv) Potential flow	**04**
	(c)	Water is flowing through a pipe of 300mm in diameter branches into two pipes of 200 mm and 100 mm respectively. If the average velocities in 300mm and 200 mm diameter pipe is 2.5m/s and 1.6 m/s, determine the velocity in 100 mm diameter pipe.	**07**
		OR	
Q.5	**(a)**	Describe principle, construction and working of rotameter.	**03**

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(b) Define hydrostatic law and derive the equation for hydrostatic law   **04**

(c) With a neat diagram explain the working principle of Rotameter   **07**

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