Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2023

Subject Code:3140110 Date:11-01-2024

Subject Name: Fluid Mechanics

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define Centre of Buoyancy.	**03**
	(b)	Explain Surface Tension Phenomena in detail..	**04**
	(c)	Explain working of U-tube Differential manometer.	**07**
Q.2	**(a)**	Define total hydrostatic force and centre of pressure.	**03**
	(b)	Derive an expression for power absorbed in Journal earing.	**04**
	(c)	Derive Hagen-Poiseuille equation for laminar flow in the circular pipe	**07**
		OR	
	(c)	Derive an expression for rate of flow through venturimeter.	**07**
Q.3	**(a)**	How lift is produced on airfoil?	**03**
	(b)	Derive Bernoulli's equation from Euler's equation and explain each term.	**04**
	(c)	Define notch and weir. Derive an expression for discharge over triangular notch section.	**07**
		OR	
Q.3	**(a)**	Explain the condition of stability for a submerged and floating body with neat diagram.	**03**
	(b)	Write a note on Stability of floating bodies.	**04**
	(c)	Explain Buckingham's π theorem in detail.	**07**
Q.4	**(a)**	Define Laminar Sub layer.	**03**
	(b)	A cylindrical block weighs 22kN having diameter of 2m and height 2.5m is to float in sea water having specific gravity 1.025. Show that it does not float vertically.	**04**
	(c)	Derive the expression of velocity potential and stream function for a source flow.	**07**
		OR	
Q.4	**(a)**	What is Dimensional Homogeneity? Explain with an example.	**03**
	(b)	Evaluate an expression for Discharge over a Triangular notch.	**04**
	(c)	Derive continuity equation for 2-D & 3-D flow in Cartesian coordinates.	**07**
Q.5	**(a)**	What is CFD? State its applications.	**03**
	(b)	Discuss 1. Source flow, 2. Sink flow and 3. Free vortex flow	**04**
	(c)	Define Reynold's number and give its significant. Explain Reynold's experiment with neat sketch.	**07**
		OR	
Q.5	**(a)**	Explain the need of inclined column manometers.	**03**
	(b)	Explain terms Circulation and Vorticity.	**04**
	(c)	Classify different types of fluid flow.	**07**

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