Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2024

Subject Code:3140110 Date:15-07-2024

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: Pressure, Metacentre, Metacentric height	**03**
	(b)	Explain working of Pitot Tube.	**04**
	(c)	Derive momentum equation for 2D and 3D in Cartesian coordinate	**07**
Q.2	**(a)**	Explain the condition of stability for a submerged and floating body with neat diagram.	**03**
	(b)	Derive Bernoulli's equation from Euler's equation and explain each term.	**04**
	(c)	Explain Velocity potential and Potential flow.	**07**
		OR	
	(c)	Derive an expression for discharge over trapezoidal notch section.	**07**
Q.3	**(a)**	How lift is produced on airfoil?	**03**
	(b)	Define 1. Source flow, 2. Sink flow and 3. Free vortex flow.	**04**
	(c)	Derive Hagen-Poiseuille equation for laminar flow in the circular pipe.	**07**
		OR	
Q.3	**(a)**	What is CFD? State its applications	**03**
	(b)	Explain in brief the losses in flow through pipes.	**04**
	(c)	Explain working of U-tube Differential manometer.	**07**
Q.4	**(a)**	Explain the need of inclined column manometers.	**03**
	(b)	Differentiate Ideal and Real Fluids.	**04**
	(c)	Derive an expression for total pressure and centre of pressure on a plane surface immersed in a liquid.	**07**
		OR	
Q.4	**(a)**	What is Dimensional Homogeneity? Explain with an example.	**03**
	(b)	Derive an expression for power absorbed in Journal earing.	**04**
	(c)	Define Reynold's number and give its significant. Explain Reynold's experiment with neat sketch.	**07**
Q.5	**(a)**	Compare Eulerian and Lagrangian frame of reference.	**03**
	(b)	Explain Newton's law of viscosity.	**04**
	(c)	Derive an expressions shear stress and velocity for HAGENPOISEVILLE LAW.	**07**
		OR	
Q.5	**(a)**	Define: (i) Atmospheric pressure (ii) Gauge pressure (iii) Absolute pressure.	**03**
	(b)	State and prove Pascal's Law	**04**
	(c)	Derive the expression of velocity potential and stream function for a source flow.	**07**

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