Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2022

Subject Code:3140110 Date:23-06-2022

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 necess+ary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Derive continuity equation for a fluid flow.	**03**
	(b)	Define density, weight density, specific weight and specific gravity as a property of a fluid.	**04**
	(c)	Define Reynold's number and give its significant. Explain Reynold's experiment with neat sketch.	**07**
Q.2	**(a)**	Derive an expression for Bernoulli's theorem.	**03**
	(b)	Derive Darcy Weisbach equation with usual notation	**04**
	(c)	Derive an expression for rate of flow through venturimeter.	**07**
		OR	
	(c)	Derive the expression of pressure gradient and shear stress for the viscous fluid flowing through two horizontal plates.	**07**
Q.3	**(a)**	Explain the need of inclined column manometers.	**03**
	(b)	Explain in brief the losses in flow through pipes.	**04**
	(c)	Derive an expression for Hagen Poiseuille's formula.	**07**
		OR	
Q.3	**(a)**	Define following terms: (1) Surface tension (2) Cohesion (3) Adhesion	**03**
	(b)	State and prove Pascal's Law	**04**
	(c)	Define metacenter and metacentric height. Explain method for determination of metacentric height.	**07**
Q.4	**(a)**	Explain the condition of stability for a submerged and floating body with neat diagram	**03**
	(b)	Define: (i) Atmospheric pressure (ii) Gauge pressure (iii) Absolute pressure (iv) Vacuum pressure	**04**
	(c)	Enlist different types of manometers and explain differential U-tube manometer.	**07**
		OR	
Q.4	**(a)**	Define total hydrostatic force and centre of pressure.	**03**
	(b)	Derive an expression for both when the surface is vertically immersed.	**04**
	(c)	Define notch and weir. Derive an expression for discharge over triangular notch section.	**07**
Q.5	**(a)**	Define circulation and velocity potential function.	**03**
	(b)	Explain flow net and state the importance of flow net.	**04**
	(c)	Derive an expression for discharge over trapezoidal notch section.	**07**
		OR	
Q.5	**(a)**	Derive the expression of velocity potential function and stream function for a linear flow.	**03**

(b) State Buckingham's π theorem. What do you mean by repeating variables? How are the repeating variables selected in dimensional analysis? **04**

(c) Derive the expression of velocity potential and stream function for a source flow. **07**

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