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GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-IV (NEW) EXAMINATION – WINTER 2020

Subject Code: 3140110

Date: 09/02/2021

Subject Name: Fluid Mechanics

Time: 02:30 PM TO 04:30 PM

Total Marks: 56

Instructions:

1. Attempt any **FOUR** questions out of **EIGHT** questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
Q.1	(a) Define: Specific Gravity, Density, Specific Volume.	03
	(b) Define the following: <ul style="list-style-type: none"> • Newtonian & Non-Newtonian Fluid • Compressibility & bulk Modulus 	04
	(c) Classify different types of Manometer. Make use of Pascal's law to explain working of U-tube manometer.	07
Q.2	(a) Define: Total Pressure, Centre of Pressure and buoyancy.	03
	(b) Define Surface Tension. Show its relationship with pressure for liquid droplet.	04
	(c) Identify the conditions for stability of floating body.	07
Q.3	(a) Define Metacenter, Metacentric height.	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) Classify different types of fluid flow.	07
Q.4	(a) Compare Eulerian and Lagrangian frame of reference.	03
	(b) Differentiate Ideal and Real Fluids.	04
	(c) Derive Continuity equation for 2-D & 3-D flow in Cartesian coordinate system.	07
Q.5	(a) Explain terms Circulation and Vorticity.	03
	(b) Evaluate an expression for Discharge over a Triangular notch.	04
	(c) Explain Velocity potential and Potential flow.	07
Q.6	(a) Explain Bernoulli's equation for real fluid.	03
	(b) Explain working of Pitot Tube.	04
	(c) Explain Buckingham's π theorem in detail.	07
Q.7	(a) What is Reynold's Number? Explain its physical significance.	03
	(b) Derive an expression for power absorbed in Journal bearing.	04
	(c) Derive an expressions shear stress and velocity for HAGEN-POISEVILLE LAW.	07

- Q.8**
- (a) Define Laminar Sub layer. **03**
 - (b) Explain Laminar and Turbulent boundary layer. **04**
 - (c) A pipe of diameter 20 cm and length 2000 m connects two reservoirs having difference of water levels as 20 m. Determine the discharge through pipe. If an additional pipe of diameter 20 cm and length 1200 m is attached to the 1200 m length of the existing pipe, find the increase in the discharge. Take $f = 0.015$ and neglect minor losses. **07**

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