Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3131307 Date:25-01-2024

Subject Name:Basics of Environmental Hydraulics

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 the terms. (1) Capillary effect (2) Viscosity (3) specific gravity	**03**
	(b)	Explain surface tension and prove the relationship between surface tension and pressure for liquid droplet.	**04**
	(c)	Derive an expression for Euler's equation of motion.	**07**
Q.2	**(a)**	State the pascal's law and prove it.	**03**
	(b)	A U-tube manometer contains the mercury as monomeric liquid. One end of manometer is connected to a pipe in which a fluid of specific gravity 0.8. The level of mercury in right limb is 7 cm above the center of pipe. Calculate pressure of fluid in a pipe when the difference of mercury level in two limbs is 17 cm.	**04**
	(c)	Define fluid and give the classification of fluids with figure.	**07**
		OR	
	(c)	Derive an expression for total pressure and center of pressure for vertical plane surface submerged in static liquid.	**07**
Q.3	**(a)**	State Bernoulli's theorem. Also write down assumptions and applications for it.	**03**
	(b)	A horizontal Venturimeter with inlet diameter 150 mm and throat diameter 75 mm is employed to measure the discharge of water. The differential manometer connected to the inlet gives reading of 150 mm of mercury. Determine the rate of flow if the co-efficient of discharge is 0.98.	**04**
	(c)	Derive an expression for equation of continuity in a 3D flow in Cartesian co-ordinates system.	**07**
		OR	
Q.3	**(a)**	Write a short note on Pitot tube.	**03**
	(b)	A pipe is having diameters, 30 cm and 15 cm at the cross sections 1 and 2 respectively, through which water is flowing. The velocity of water at section-1 is given as 6 m/s. determine the velocity head at section-1 and 2 and also flow rate.	**04**
	(c)	Derive an expression for rate of flow through Venturimeter.	**07**
Q.4	**(a)**	Classify the various energy (Major & Minor) losses in pipe.	**03**
	(b)	Differentiate between open channel and pipe flow.	**04**
	(c)	Derive a Darcy Weisbach equation for Head Loss due to friction in pipe and also derive Chezy's formula from that.	**07**
		OR	

Q.4	**(a)**	Define EGL and HGL.	**03**
	(b)	Explain the different types of fluid flow.	**04**
	(c)	Derive an expression for most efficient and economical cross section for rectangular cross section	**07**
Q.5	**(a)**	Explain the term vena contracta.	**03**
	(b)	Give classification of orifices and mouthpieces.	**04**
	(c)	Derive an expression for discharge through a large rectangular Orifice.	**07**

OR

Q.5	**(a)**	Define all hydraulic co-efficient.	**03**
	(b)	Differentiate between Notch & Weir.	**04**
	(c)	Derive an expression for discharge through triangular notch/weir.	**07**

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