Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3131307 Date:18-07-2022

Subject Name:Basics of Environmental Hydraulics

Time:02:30 PM TO 05:00 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 following terms: (1) Mass Density (2) Gauge Pressure (3) specific gravity	**03**
	(b)	Explain the effect of temperature on the viscosity of liquids and gases.	**04**
	(c)	Explain the different types of fluids with figure.	**07**
Q.2	**(a)**	Explain piezometer with simple sketch.	**03**
	(b)	The weight of $5m^3$ of a certain oil is 45 kN. Calculate its specific weight, mass density and specific gravity.	**04**
	(c)	Derive an expression for Euler's equation of motion.	**07**
		OR	
	(c)	Derive an expression for Bernoulli's equation and mention the assumptions.	**07**
Q.3	**(a)**	Explain EGL and HGL.	**03**
	(b)	Explain steady, unsteady, rotational and irrotational flow.	**04**
	(c)	Derive Darcy Weisbach equation for loss of head due to friction in a pipe line.	**07**
		OR	
Q.3	**(a)**	State and prove Pascal's Law.	**03**
	(b)	Differentiate between Laminar and Turbulent flow.	**04**
	(c)	The water is flowing through a taper pipe of length 110 m having diameters 500 mm at the upper end and 250 mm at the lower end at the rate of 60 liters/s. The pipe has a slope of 1 in 50. Determine the pressure at the lower end if the pressure at the higher level is 70 kN/m^2 .	**07**
Q.4	**(a)**	Classify various energy (Major Loss and Minor) losses in pipe.	**03**
	(b)	The diameter of a pipe at the section 1-1 and 2-2 are 150 mm and 250 mm respectively. If the velocity of water flowing through the pipe at section 1-1 is 4.5 m/s. Calculate discharge through the pipe and velocity of water at section 2-2.	**04**
	(c)	Derive an expression for the equation of continuity in a 3D flow in Cartesian co-ordinate system.	**07**
		OR	
Q.4	**(a)**	Distinguish between pathlines, stream lines and streak lines.	**03**
	(b)	What is vena-contracta and how does it occur?	**04**
	(c)	Derive an expression for most efficient and economical cross section for rectangular cross section.	**07**

Q.5	**(a)**	Give classification of Mouthpieces	**03**
	(b)	Distinguish between Notches and Weirs.	**04**
	(c)	Derive an expression for the discharge through a large orifice.	**07**

OR

Q.5	**(a)**	Give classification of orifice.	**03**
	(b)	Give the advantages of triangular notch over a rectangular notch.	**04**
	(c)	Derive an expression for the discharge through a triangular notch.	**07**

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