Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3131307 Date:27-02-2023

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 & Explain (i) Density (ii) Gauge Pressure (iii) Specific Gravity	**03**
	(b)	Explain the term viscosity and differentiate between Kinematic viscosity and Dynamic viscosity.	**04**
	(c)	Derive an expression for Bernoulli's equation and mention the Assumptions.	**07**
Q.2	**(a)**	Define the term: Pitot tube.	**03**
	(b)	Explain the different types of fluids.	**04**
	(c)	State and prove the Pascal's law.	**07**
		OR	
	(c)	Derive an expression for the discharge through an Orificemeter.	**07**
Q.3	**(a)**	Define Total energy line and Hydraulic Gradient Line	**03**
	(b)	A flat plate 30 cm × 50 cm slides on oil (μ = 0.8 Ns/m^2) over a large plane surface. What is the force required to drag the plate at 2 m/s if separating oil film is o.4 mm thick ?	**04**
	(c)	Derive Chezy's formula for calculating loss of head due to friction in pipe.	**07**
		OR	
Q.3	**(a)**	Define Laminar flow and Turbulent Flow.	**03**
	(b)	Find the diameter of a pipe length 2000 m when the rate of flow of water through the pipe is 200 lit/s head loss due to friction is 4 m. take the value of C = 50 in Chezy's formula.	**04**
	(c)	List the minor losses and Derive formula for calculating loss of head due to sudden contraction.	**07**
Q.4	**(a)**	Define Co-efficient of Discharge and Co-efficient of Velocity.	**03**
	(b)	Find the discharge through a totally drowned orifice 2.0 m wide and 1 m deep, if the difference of water levels on both the sides of the orifice be 3 m. take C_d = 0.62.	**04**
	(c)	Derive an expression for time of emptying a tank through an orifice of circular horizontal tank.	**07**
		OR	
Q.4	**(a)**	Classification of Orifice.	**03**
	(b)	Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. the rate of flow of water through the pipe is 250 lit/s.	**04**
	(c)	Derive an expression for time of emptying a tank through an orifice of rectangular tank.	**07**
Q.5	**(a)**	Define Vena-contracta and co-efficient of contraction.	**03**
	(b)	Distinguish between Notches and Weirs.	**04**
	(c)	Derive an expression for the discharge over a trapezoidal notch or weir.	**07**

OR

Q.5	**(a)**	Classification of flow in channels.	**03**
	(b)	Classification of Notches and weirs.	**04**
	(c)	Derive an expression for the discharge over a Rectangular notch or weir.	**07**