Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2141307 **Date:15/05/2019**

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.**

			MARKS
Q.1	**(a)**	Define: (i) specific gravity (ii) viscosity (iii) mass density	**03**
	(b)	Differentiate between: (i) ideal fluid and real fluid (ii) cohesion and adhesion	**04**
	(c)	Explain phenomena of capillarity. Obtain an expression of capillary rise of a liquid.	**07**
Q.2	**(a)**	Define the term Total pressure and centre of pressure.	**03**
	(b)	A cylinder container has a diameter of 0.5 m and a height of 1 m. If it is to be filled with a liquid having a specific weight of 2000 N/m^3, how many kg of this liquid must be added?	**04**
	(c)	Derive an Expression for the depth of centre of pressure when lamina is immersed in a liquid at an angle with horizontal.	**07**
		OR	
	(c)	Discuss and derive an expression of discharge through partially submerged orifice.	**07**
Q.3	**(a)**	Differentiate between simple manometer and differential manometer.	**03**
	(b)	Explain with sketch the relationship between various types of pressure.	**04**
	(c)	Two tanks A and B have 70 m difference in water levels, and are connected by a pipe 0.25 m diameter and 6 km long with 0.002 friction coefficient. The pipe is tapped at its mid point to leak out 0.04 m3/s flow rate. Minor losses are ignored. Determine the discharge leaving tank A? Find the discharge entering tank B?	**07**
		OR	
Q.3	**(a)**	State limitations in use of piezometer and simple u-tube manometer.	**03**
	(b)	Derive Euler's equation of motion along streamline. Also state assumption made.	**04**
	(c)	Two reservoirs have 6 m difference in water levels, and are connected by a pipe 60 cm diameter and 3000 m long. Then, the pipe branches into two pipes each 30 cm diameter and 1500 m long. The friction coefficient is 0.01. Neglecting minor losses, determine the flow rates in the pipe system?	**07**
Q.4	**(a)**	Define: (i) Orifice, (ii) Notch and (iii) Weir	**03**
	(b)	Derive the equation for coefficient of discharge.	**04**
	(c)	Water is discharging through an external cylindrical mouthpiece of diameter 120 mm under a constant head of 5 m. Calculate discharge and absolute pressure head of water at vena-contracta. Take atmospheric pressure head = 10.3 m of water, Cd = 0.855, Cc for vena contracta = 0.62	**07**
		OR	

Q.4	**(a)**	Define following terms: (1) Hydraulic gradient line, (2) Energy gradient line, (3) Equivalent pipe	**03**
	(b)	Differentiate between triangular notch and rectangular notch.	**04**
	(c)	Derive an expression for time of emptying a circular horizontal tank with an orifice at its bottom.	**07**
Q.5	**(a)**	What is mouthpiece? Enlist the classification of mouthpiece.	**03**
	(b)	Derive an expression for time of emptying a tank with rectangular weir.	**04**
	(c)	Determine the time required to lower the water level from 3 m to 2 m in a reservoir of dimension 60m x 60m, by (i) a rectangular notch of length 1m, (ii) a right angled V-notch. Take Cd = 0.62.	**07**

OR

Q.5	**(a)**	Define open channel flow. Explain its types in detail.	**03**
	(b)	Compare the Open Channel Flow & Pipe Flow	**04**
	(c)	What do you mean by "Most economical section" of an open channel? How it is determine? What are the conditions for the rectangular channel for best conditions?	**07**

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