Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (New) EXAMINATION – WINTER 2015

Subject Code:2141307 **Date:06/01/2016**

Subject Name: Basics of Environmental Hydraulics

Time: 02:30pm to 05:00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	State and derive Pascal's Law.	**07**
	(b)	Explain V-notch. Derive a relation for discharge through it.	**07**
Q.2	**(a)**	Derive a relation for equation of continuity for a 2D flow.	**07**
	(b)	Derive Darcy-Weisbach formula. Classify energy losses in pipes.	**07**
		OR	
	(b)	Determine the height of a rectangular weir of length 5m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.5 m and discharge is 1.5 m^3/sec. Take C_d=0.6 and neglect the contraction.	**07**
Q.3	**(a)**	Derive an expression for flow rate for an orifice meter.	**07**
	(b)	State and differentiate between notches and weir. Discuss the classification of weirs in detail.	**07**
		OR	
Q.3	**(a)**	Derive a relation for Centre of pressure and total pressure for a vertical surface submerged in water.	**07**
	(b)	Enlist different types of manometers	**07**
Q.4	**(a)**	Derive an expression for the time of emptying a tank through an orifice of a hemispherical tank.	**07**
	(b)	Describe the concept of fluid as a continuum and control volume concept.	**07**
		OR	
Q.4	**(a)**	Explain Energy gradient line and Hydraulic gradient line with the help of an example.	**07**
	(b)	Derive an expression for most efficient cross section for a rectangular section.	**07**
Q.5	**(a)**	Derive empirical formula for the determination of flow through open channel.	**07**
	(b)	A horizontal pipe of 400 mm diameter is suddenly contracted to 200 mm diameter. The pressure intensities in the large and small pipe are given as 140kN/m^2 and 120kN/m^2 respectively. If the rate of flow of water is 200L/s, find the value of coefficient of contraction, C_c.	**07**
		OR	
Q.5	**(a)**	Explain the term open channel flow. Also discuss various types of open channel.	**07**
	(b)	The water is flowing through a taper pipe of length 110 m having diameters 500mm at the upper end and 250mm at lower end, at the rate of 60 L/sec. The pipe has a slope of 1 in 50. Determine the pressure at lower end if the pressure at the higher end is 70kN/m^2.	**07**

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