Seat No.: Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2018

Subject Code:2141307 **Date:01/12/2018**

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.**

Q.1	**(a)**	Differentiate between Uniform & Non-uniform flow.	**03**
	(b)	Write Bernoulli's equation and also mention the assumptions made for the Bernoulli's equation.	**04**
	(c)	Define fluids and give the classification of fluids with figure.	**07**
Q.2	**(a)**	Explain the concept of velocity approach.	**03**
	(b)	Derive equation for Newton's Law of Viscosity.	**04**
	(c)	Derive a Darcy Weisbach equation for Head Loss due to friction in pipe.	**07**
		OR	
	(c)	Derive an expression for loss of head due to sudden enlargement.	**07**
Q.3	**(a)**	Explain the EGL and HGL.	**03**
	(b)	A flat plate of area 2 X 10^6 mm^2 is pulled with a speed of 0.5 m/s relative to another plate located at a distance of 0.1 mm from it. Determine the force and power required to maintain this speed, if the fluid separating them is having viscosity as 0.1 $N.s/m^2$.	**04**
	(c)	Derive an Expression for discharge over a triangular Notch.	**07**
		OR	
Q.3	**(a)**	Show that Cd=Cv x Cc for pipe flow.	**03**
	(b)	Specific gravity of a liquid is 0.7 Find Mass density & specific weight. Also find the mass and weight of 10 Liters of liquid.	**04**
	(c)	Derive an expression for Euler's equation of motion.	**07**
Q.4	**(a)**	Define Small orifice. What is vena contracta?	**03**
	(b)	A U-tube manometer contains the mercury as manometric 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 8 cm above the entre of pipe. Calculate pressure of fluid in a pipe when the difference of mercury level in two limbs is 18 cm.	**04**
	(c)	The head of water over an orifice of diameter 100 mm is 10 m. the water coming out from orifice is collected in a circular tank of diameter 1.5 m. The rise of water level in this tank is 1.0 m in 25 seconds. Also the co-ordinates of a point on the jet, measured from vena-contracta are 4.3 m horizontal and 0.5 m vertical. Find the co-efficients C_d, C_v and C_c.	**07**
		OR	

Q.4	**(a)**	Write a short note on differential U-manometer.	**03**
	(b)	State & prove Pascal's Law.	**04**
	(c)	Derive an expression of flow measurement using orifice meter.	**07**
Q.5	**(a)**	Describe the advantages of triangular notch or weir over rectangular notch or weir.	**03**
	(b)	Differentiate between open channel flow and pipe flow.	**04**
	(c)	A horizontal venturimeter with the inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of oil of sp. gr. 0.8. the discharge of oil through venturimeter is 60 lit/sec. find the reading of the oil-mercury differential manometer. Take C_d=0.98.	**07**

OR

Q.5	**(a)**	Differentiate between Notch & Weir	**03**
	(b)	Find the time required to loser the water level from 3m to 2 m in a reservoir of dimension 80 m X 80 m by a rectangular notch of length 1.5 m. Take C_d=0.62.	**04**
	(c)	Derive an expression for equation of continuity in a 3D flow in Cartesian co-ordinates system.	**07**

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