

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- III (New) EXAMINATION – WINTER 2019

Subject Code: 3131307

Date: 3/12/2019

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.

- Q.1** (a) Define & Explain (i) Mass density (ii) Specific Weight (iii) Viscosity **03**
 (b) Write a short note on Piezometer. **04**
 (c) Explain the different types of fluids with figure. **07**

- Q.2** (a) State Bernoulli's theorem and write down the assumptions for it. **03**
 (b) Explain with sketch the relationship between various types of pressure. **04**
 (c) Derive an expression for equation of continuity in a 3D flow in Cartesian co-ordinates system. **07**

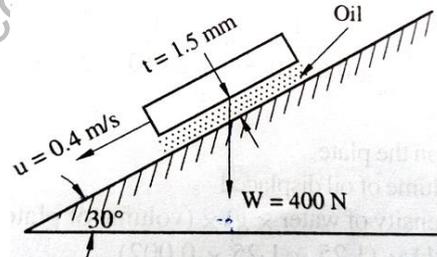
OR

- (c) Derive an expression for Euler's equation of motion. **07**

- Q.3** (a) Give the classification of Orifices. **03**
 (b) Specific gravity of a liquid is 0.7 Find i) Mass density ii) specific weight. **04**
 Also find the mass and weight of 10 Liters of liquid.
 (c) State and explain the Pascal's law. **07**

OR

- Q.3** (a) Give the classification of mouthpieces. **03**
 (b) An oil is used for lubrication between a square plate of size 0.9 m X 0.9 m and an inclined plane with angle of inclination 30° as shown in figure. The weight of the square plate is 400 N and it slides down the inclined plane with a uniform velocity of 0.4 m/s. the thickness of oil film is 1.5 mm. Determine the dynamic viscosity of an oil. **04**



- (c) State and explain the Hydrostatic law. **07**

- Q.4** (a) What is vena-contracta and how does it occur? **03**
 (b) Give the classification of the various energy (Major & Minor) losses in pipe. **04**
 (c) A horizontal venturimeter with inlet diameter 150 mm and throat diameter 75 mm is employed to measure the discharge of water. The differential manometer connected to the inlet gives reading of 150 mm of mercury. Determine the rate of flow if the co-efficient of discharge is 0.98. **07**

OR

- Q.4** (a) Compare steady, unsteady, rotational and irrotational flow. **03**
 (b) Explain EGL and HGL. **04**
 (c) The water is flowing through a tapering pipe having diameter 250 mm and 125 mm at section 1 and 2 respectively. The discharge through the pipe is 30liters/sec. the section 1 is 9m above datum and section 2 is 5m above datum. Determine the intensity of pressure at section 2 if that at section 1 is 440 kN/m^2 . **07**

- Q.5** (a) Differentiate between Notch and Weir **03**
(b) Find the discharge through a trapezoidal notch which is 1.2 m wide at the top and 0.5 m at the bottom and is 0.4 m in height. The head of water on the notch is 0.3 m. C_d for rectangular = 0.62 and C_d for triangular=0.6. **04**
(c) What do you mean by “Most economical section” of an open channel? How it is determined? What are the conditions for the rectangular channel for best conditions? **07**

OR

- Q.5** (a) Give the advantages of triangular notch over a rectangular notch. **03**
(b) A rectangular orifice of 1.6 m width and 1 m deep is fitted in one side of a large tank. The water level on one side of the orifice is 3.5 m above the top edge of the orifice, while on the other side of the orifice, the water level is 0.4 m below its top edge. Find the discharge through the orifice if $C_d = 0.63$. **04**
(c) Explain the different types of open channel flow in detail. **07**

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