

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2141307

Date: 12/12/2019

Subject Name: Basics of Environmental Hydraulics

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

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

- Q.1** (a) Compare steady, unsteady, uniform and non-uniform flow. **03**
 (b) Write a short note on differential U-Tube Manometer. **04**
 (c) Explain the different types of fluids with figure. **07**

- Q.2** (a) Derive equation for Newton's Law of Viscosity. **03**
 (b) State and prove Pascal's Law. **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) Define: (i) Specific Weight (ii) Rotational Flow (ii) Atmospheric Pressure **03**
 (b) Discuss the concept of center of pressure. **04**
 (c) Give the classification of various energy (Major & Minor) losses in pipe. **07**

OR

- Q.3** (a) Define: (i) Mass density (ii) Laminar flow (iii) Absolute Pressure **03**
 (b) A vertical isosceles (two sides are same) triangular gate with its vertex up has a base width 1 m and height 1.5 m. If the vertex of the gate is 1 m below the free water surface, find (i) pressure force (ii) center of pressure. **04**
 (c) Derive the formula for loss of head due to sudden enlargement. **07**

- Q.4** (a) Explain the EGL and HGL. **03**
 (b) A rectangular channel of width 4 m is having a bed slope of 1 in 1500. Find the maximum discharge through the channel. Take value of $C=50$. **04**
 (c) The water is flowing through a tapering pipe having diameter 250mm and 125mm 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 450kN/m^2 . **07**

OR

- Q.4** (a) What is mouthpiece? Give the classification of mouthpiece. **03**
 (b) Explain the concept of velocity approach. **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**

- Q.5** (a) A rectangular notch 2 m wide has a constant head of 500 mm. Find the discharge over the notch, if $C_d=0.62$. **03**
 (b) What are the differences between closed and open channel flow? **04**
 (c) Define large orifice. How is the discharge is calculated through large orifice? **07**

OR

- Q.5** (a) Determine the time required to lower the water level form 4 m to 3 m in a reservoir of dimensions 80 m X 80 m, by a rectangular notch of length 1 m. Take $C_d= 0.62$. **03**
 (b) Differentiate between Notch & Weir. **04**
 (c) Derive an expression for discharge over a triangular notch. **07**