GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-IV (NEW) - EXAMINATION - SUMMER 2017 Subject Code: 2141307 Date: 03/06/2017 **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. 3. Figures to the right indicate full marks. MARKS Q.1 **Short Questions** 14 Units of dynamic viscosity is ____ 1 Pressure measured with the help of a piezometer tube is 2 (a) absolute pressure (b) gauge pressure (c) atmospheric pressure (d) none of above 3 The loss of head at the entrance to a pipe from a tank is equal to loss of head due to (a) sudden contraction (b) sudden enlargement (c) friction (d) bend A Cippoletti weir is a 4 (a) rectangular weir (b) triangular notch (c) trapezoidal weir (d) trapezoidal weir with its sides each having a slope of 0.25 For measuring discharge at varying heads, the notch 5 preferred is (a) rectangular (b) triangular (c) trapezoidal (d) stepped Hydraulic gradient of pipeline represents 6 (a) pressure head (b) velocity head (c) datum head (d) total head 7 The pressure of liquid at the sections where a siphon and a hydraulic gradients intersect is (a) above atmosphere (b) below atmosphere (d) atmosphere (c) zero The point, through which the resultant pressure force acts 8 due to fluid pressure called (a) metacentre (b) centre of buoyancy (c) centre of pressure (d) none of above 9 Which one is completely theoretical line? (a) streamline (b) steakline (c) pathline (d) filamentline 10 The working principle of Venturimeter is based on (a) Bernoulli's equation (b) Continuity equation

(c) momentum equation (d) none of above

11	The discharge coeff	ficient for venturimeter	varies between
	(a) 0.60 to 0.68	(b) 0.70 to 0.78	
	(c) 0.52 to 0.60	(d) 0.96 to 0.98	

12 Cohesive forces are more in case of

(a) Liquid fluid (b) gaseous fluid
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- (c) equal in both (d) none of above
- **13** Pressure intensity in water at a level of 1 m below the free surface of water is

(a) 9.81 kpa	(b) 9.81 pa
(c) 1 bar	(d) 100 kpa

14 Newton's Law of viscosity states that

Q.2 (a) Explain the concept of compressibility and bulk modulus.

- (**b**) State and prove hydrostatics law.
- (c) A rectangular plate 2m wide and 5m long is immersed in water in such a way as (i) Horizontally 1m below the free surface of water (ii) Vertically, 2 m side is parallel to the water surface and 1 m below the free surface of water. Find :
 - (a) total pressure on the plate
 - (b) position of centre of pressure.

OR

- (c) Classify the losses in pipes. Derive the Darcy-Weisbach 07 formula.
- Q.3 (a) What is vena contracta and how does it occure? What is its 03 approximate distance from the orifice?
 - (b) What is mouthpiece? Discuss different types of mouthpiece 04 along with their special features.
 - (c) Derive an expression for discharge through a large 07 rectangular Orifice.

OR

- Q.3 (a) Define: Subcritical flow, Critical flow, Supercritical flow. 03
 - (b) Differentiate between Open channel flow and 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.
- Q.4 (a) Write Bernoulli's equation and also write the assumptions 03 made for the Bernoulli's equation.
 - (b) The water is flowing through a tapering pipe having diameter 250 mm and 125 mm at section 1 and 2 respectively. The discharge through a pipe is 30 liters/s. The section 1 is 9m above datum and section 2 is 5m above the datum. Sketch the arrangement and determine the intensity of pressure at section 2 if that at section 1 is 450 KN/m²
 - (c) Derive an expression for total pressure and centre of 07 pressure for vertically immersed surface.

OR

- Q.4 (a) Define:- Compressible Flow, Incompressible flow, laminar 03 flow.
 - (b) Write a short note on differential U-manometer
 (c) Derive an expression of discharge for orificemeter.
 07
- Q.5 (a) Define notch. Give the classification of notch.
 (b) In a pipe of diameter 350 mm and length 75m water is flowing at a velocity of 2.8m/s. find the head lost due to

03

04

07

friction using:

(i) Darcy-Weisbach formula (ii) Chezy's formula for which C=55.

(c) Derive the formula for loss of head due to sudden 07 enlargement.

OR

- Q.5 (a) Give the advantages of triangular notch over a rectangular 03 notch.
 - (b) Derive an expression for discharge over a rectangular notch. 04
 - (c) Derive an expression for the time required to empty a tank 07 with rectangular notch.
