

320352(20)

B. E. (Third Semester) Examination, Nov.-Dec. 2016

(New Scheme)

(Civil Engg. Branch)

FLUID MECHANICS-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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Note : Attempt all questions. Part (a) from each question is compulsory. Attempt any two parts from part (b), (c) and (d) of each question.

Unit-I

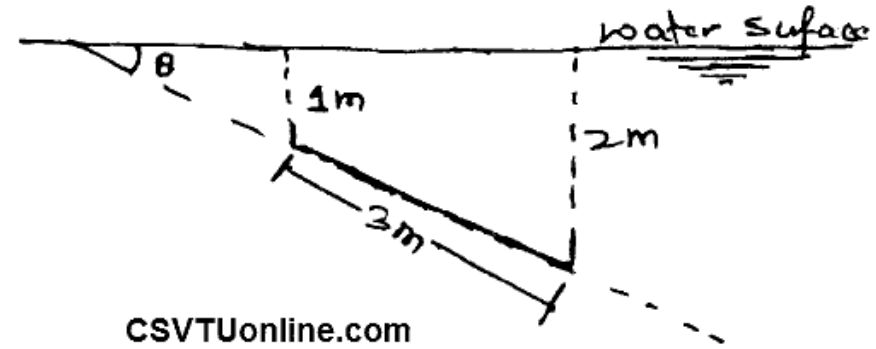
- 1. (a) Define perfect or ideal fluid. 2
- (b) Explain types of fluids which can be classified on the basis of property of viscosity. 7

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- (c) A circular plate 3 m in diameter is submerged in water as shown in figure, its greatest and least depths below the water surface being 2 m and 1 m. Find the total pressure on one side of the lamina and depth of centre of pressure. 7



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- (d) Discuss the conditions of equilibrium of a floating body briefly. 7

Unit-II

- 2. (a) Define stream line. 2
- (b) Define the following : 7
 - (i) Path line
 - (ii) Streak line
 - (iii) Potential line
 - (iv) Stream tube
 - (v) Laminar flow

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(vi) Turbulent flow

(vii) Reynold's number

(c) Explain velocity potential and stream function for their function with a suitable example. 7

(d) A stream function is given by $\psi = 2xy$. Show that the flow is irrotational and continuous. 7

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Unit-III

3. (a) State Bernoulli's Theorem. 2

(b) Derive the expression for Euler's equation of motion. 7

(c) The top and bottom diameter of a 2 m long vertical tapering pipe are 100 mm and 50 mm respectively. Water flows down the pipe at 30 lit/sec. Find the pressure difference between the two ends of the pipe. 7

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(d) Give a tabular comparison between venturimeter and orifice meter. 7

Unit-IV

4. (a) What do you mean by water laminar? 2

(b) A 400 mm diameter new cast iron pipe 400 m long connected to reservoirs. The ends of the pipe are

square cornered and submerged. When the rate of flow through the pipe is 0.35 m³/sec, find the difference in levels of the water surfaces in the two reservoirs. Take $f = 0.005$. 7

(c) Derive the condition for the rectangular channel of best section. Show that the hydraulic mean depth for such a channel is one-half the depth of flow. 7

(d) A rectangular channel has a width of 2.50 m and a bed slope of 1 in 400. What will be the depth of water if the rate of flow is 8.50 m³/sec. Take $C = 50$. 7

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Unit-V

5. (a) What is the purpose of fitting a mouthpiece to an orifice? 2

(b) Define coefficient of contraction, coefficient of velocity and coefficient of discharge. What is the relation between them? 7

(c) What is Cipoletti Weir? Explain. 7

(d) The water in a tank is 2 m deep and over the water surface, the air pressure is 70 kPa above atmospheric pressure. Find the rate of flow from an orifice of diameter 50 mm in the bottom of the tank. Take $C_d = 0.6$. 7