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IV Semester Diploma Examination, April/May-2019

HYDRAULICS

Time : 3 Hours]

[Max. Marks : 100

- Note :**
- (i) Answer any **six** full questions from PART – A, each question carries **5** marks.
 - (ii) Answer any **seven** full questions from PART – B, each question carries **10** marks.

PART – A

1. What do you understand by the term 'Intensity of pressure' ? State its units. 5
2. Distinguish between Simple Manometer and Differential Manometer. 5
3. Define : 2
 - (a) Discharge 2
 - (b) Continuity equation of a flowing fluid. 3
4. Differentiate between uniform flow and non-uniform flow. 5
5. How the orifices are classified ? List them. 5
6. Differentiate between Notch and a Weir. 5
7. Explain briefly Hydraulic gradient line and total energy line with a neat sketch. 5
8. Specify conditions of most economical section for rectangular and trapezoidal channels. 5
9. Distinguish between centrifugal pump and reciprocating pump. 5

PART - B

10. (a) Find the depth of oil of relative density 0.85 which will produce the pressure intensity of 416.75 kN/m^2 . 5
- (b) A simple manometer containing mercury is used to measure the pressure of water flowing in a pipe-line. The mercury level in the open tube is 60 mm higher than that on the left tube. If the height of water in the left tube is 50 mm, find the pressure in the pipe in terms of head of water. 5
11. A rectangular surface is 2 m wide and 3 m deep. It lies in vertical plane in water. Determine the total pressure and centre of pressure on the plane surface when its upper edge is horizontal and
- (a) coincides with water surface. 5
- (b) 2.5 m below free water surface. 5
12. The water is flowing through a pipe having diameter 200 mm and 100 mm at section 1 and 2 respectively. The rate of flow through pipe is 35 litres/sec. The Section-1 is 6 m above datum and Section-2 is 4 m above datum. If the pressure at Section-1 is $39.24 \times 10^4 \text{ N/m}^2$, find the intensity of pressure at Section-2. 10
13. A horizontal venturimeter with inlet and throat diameters 300 mm and 150 mm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and throat is 200 mm of mercury. Determine rate of flow. Take $C_d = 0.98$ 10
14. (a) A jet of water flowing from a sharp edged vertical orifice under a constant head of 100 mm at a certain point has a horizontal and vertical co-ordinates measured from the vena-contracta as 200 mm and 105 mm respectively. Find the value of C_v and C_c if $C_d = 0.60$. 5
- (b) Find the discharge over a triangular notch of 60° when the head over the notch is 0.3 m. Assume $C_d = 0.6$. 5

5. (a) The daily record of rainfall over a catchment area is 0.2 million cubic meters. It has been found that 80% of the rain water reaches the storage reservoir and then passes over a rectangular weir. What should be the length of weir, if the water is not to rise more than 400 mm above the crest. Take $C_d = 0.61$. 5
- (b) Find the length of Cippoletti weir required for a flow of 425 litres per second if the head of water is not to exceed $1/10^{\text{th}}$ of its length. Take $C_d = 0.6$. 5
6. Explain with a neat sketch discharge over a Trapezoidal Notch. 10
7. A town having a population of 1 lakh is to be supplied with water from a reservoir at 5 km distance. It is stipulated that one-half of the daily supply of 150 litres per head should be delivered within 8 hours. What must be the size of the pipe to furnish the supply, if the head available is 12 metres ? Take $C = 45$. 10
8. (a) A rectangular channel is 1.5 metres deep and 6 metres wide. Find the discharge through the channel, when it runs full. Take slope of the bed as 1 in 900 and Chezy's constant as 50. 5
- (b) A most economical trapezoidal channel has an area of flow 3.5 m^2 . Find the discharge in the channel, when running 1 m deep. Take $C = 60$ and bed slope 1 in 800. 5
9. Explain with a neat sketch the working of single acting reciprocating pump. 10
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