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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2022

HYDRAULICS

[Maximum Marks: **100**] [Time: **3** Hours]

PART-A

[Maximum Marks: **10**]

I. (Answer ***all*** questions in one or two sentences. Each question carries ***2*** marks)

1. Define the term 'specific gravity'
2. Define the term 'discharge'.
3. Define 'vena contracta'
4. What is mean by velocity of approach?
5. Define the term wetted perimeter. (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

II. (Answer ***any five*** of the following questions. Each question carries ***6*** marks)

1. A differential manometer is used to measure the difference of pressure of oil of specific gravity 0.80 contained in two pipes at same level. If the deflection of the manometric liquid, which is mercury, be 100mm. Determine the difference of pressure of oil in the two pipes.
2. List the types of fluid flow.
3. Explain hydraulic coefficients.
4. Water discharge at the rate of 98.2 liters per second through a 120mm diameter vertical sharp edged orifice placed under a constant head of 10 meters. A point, on the jet, measured from the vena contracta of the jet has coordinates of 4.50 meters horizontal and 0.54 meters vertical. Find the hydraulic coefficients of the orifice.
5. List the advantages of triangular notch over rectangular notch.
6. Sketch a typical layout of hydroelectric power plant and list the main components.
7. Find the diameter of the pipe of length 2000 meter, when the rate of flow of water through the pipe is 200 liters/s and the head loss due to friction is 4m. Take value of f=0.006 in Darcy's formula. (5 x 6 = 30)

PART-C

[Maximum Marks: **60**]

(Answer ***one*** full question from each Unit. Each full question carries **15** marks)

UNIT – I

III. (a) Distinguish atmospheric, gauge and absolute pressure. (7)

(b) Determine the total pressure and position of centre of pressure on a circular plate of diameter 2 meter which is placed vertically in such a way that the centre of plate is 4 meter below the free surface of water.. (8)

OR

IV. (a) Explain Bernoulli's theorem, what are the assumptions in it? (7)

(b) A ventnrimeter is placed in a horizontal pipe of 50 mm diameter through which water is flowing. The diameter of the throat is 20 mm. Determine the discharge through the pipe in liters per minute. When the venturi head is 420 mm of water.

Assume the coefficient of the meter as 0.97. (8)

UNIT – II

V. (a) A rectangular orifice 1 m wide and 0.30 m deep is provided on the vertical side of a tank containing a liquid. If the upper edge of the orifice is 0.25 m below the free surface of liquid in the tank, find the discharge through the orifice , Take Cd= 0.62 , also find the discharge if the orifice is treated as a small one. (7)

(b) Explain the working of Impulse turbine. (8)

OR

VI. (a) List the advantages of centrifugal pumps over the reciprocating pumps. (7)

(b) An internal mouth piece of diameter 60 mm is discharging water under a constant head of 9 m. Find the discharge in Litres/sec. If the mouth piece is (i) running full (ii) running free. (8)

UNIT- III

VII. (a) Write short notes on the following (i) Storage reservoir (ii) Penstock. (iii) Surge tank. (7)

(b) Water flows over a rectangular notch 1m wide at a depth of 150 mm and afterwards passes through triangular right angled notch. Taking Cd for the rectangular and triangular notch as 0.62 and 0.59 respectively, find the depth of water over the triangular notch. (8)

OR

VIII. (a) Derive the expression for discharge over a trapezoidal notch or weir. (7)

(b) A broad crested weir is built across a rectangular channel 6 m wide , the head above the crest is 700 mm. If Cd= 0.60, find out the maximum discharge and head causing flow. If the channel has a cross sectional area of $5m^2$, Determine the maximum discharge considering velocity approach. (8)

UNIT - IV

IX. (a) List the major and minor losses of head of water flowing through pipes. (7)

(b) A rectangular open channel has a width of 6 m and a slope of 1 in 1000. Determine the mean velocity of flow and the discharge when the depth of water is 4 m. Take chezy's constant C = 60. (8)

OR

X. (a) Describe the effect of water hammer in pipes. (7)

(b) Water flows through a pipe 200mm diameter, 60m long with a velocity of 2.50 m/s Find the head loss in friction. (i) By using Darcy's formula if 'f'= 0.005

(ii) By using Chezy's formula if 'C' = 55 (8)

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