

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2023**

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 terms: surface tension and capillarity.
2. Define the term vena contracta.
3. Define the terms: a) Orifice b) Notch.
4. Define total energy line.
5. Define the term hydraulic mean depth.

(5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

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

1. Distinguish among atmospheric pressure, gauge pressure and absolute pressure.
2. The vacuum gauge reads 650 mm of Hg vacuum. Find absolute pressure in bar assuming the atmospheric pressure is 1.01325 bar.
3. Define Orifice and explain the types of orifices.
4. Define the various hydraulic coefficients and also derive the relationship among them.
5. Sketch a typically out of a hydroelectric power plant and name its components.
6. Derive the formulae for discharge over a rectangular notch.
7. Differentiate between flow through pipes and flow through open channels.

(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. Discuss on the various pressure measuring instruments. (6)

b. The left limb of a manometer is connected to a pipe in which a fluid of specific gravity 0.8 is flowing. The right limb containing mercury is open to the atmosphere. The center of the pipe is 100 mm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of Mercury level in the two limbs is 250mm.

(9)

OR

- IV. a. Write notes on: (i) Steady and unsteady flow (ii) uniform and non-uniform flow (iii) laminar and turbulent flow. (6)
- b. Water is flowing into a horizontal tapered pipe of diameter 200 mm at the larger end and 100 mm at the smaller end. The velocity of water at the larger end is 4.5 m/s. Determine the rate of discharge and velocity at the smaller end. (9)

UNIT – II

- V. a. The head of water or the center of an orifice of diameter 40 mm is 10 m. What is the coefficient of discharge for the orifice, if the actual discharge 10.75 litres/sec. (7)
- b. Write notes on mouth pieces and various types of mouth pieces. (8)

OR

- VI. a. Explain the experimental determination of hydraulic coefficients. (7)
- b. Differentiate between impulse and reaction turbines. (8)

UNIT- III

- VII. a. Give the advantages of a triangular notch over a rectangular notch. (7)
- b. Rectangular notch has a discharge of 233 litres /second, when the head of water is $\frac{1}{3}$ of the length of the notch. Find the length of the notch; assume the coefficient of discharge as 0.62. (8)

OR

- VIII. a. The head of water over a rectangular notch is 900 mm. The discharge is 300 litres/second. Find the length of the notch when coefficient of discharge is equal to 0.62. (7)
- b. Define notches and weirs. Also list the various classifications of notches and weirs. (8)

UNIT - IV

- IX. a. Explain the major and minor energy losses in pipe flow. Also write down the Darcy Weisbach equation for finding the head loss due to friction. (7)
- b. A cast iron pipe 200mm diameter and 600m long connects two reservoirs. If the difference of water levels in the 2 reservoir is 30 M, find the discharge through the pipe. Friction coefficient for the pipe is 0.01. Consider all the minor losses. (8)

OR

- X. a. Water is flowing through a pipe of 250 mm in diameter and 100 M long with a velocity 2.5 m/s. Find the head loss due to friction using Darcy's formulae and Chezy's formulae. Assume $f = 0.005$ and $C = 55$. (7)
- b. Find the discharge through a trapezoidal channel of width 8 m and side slope of 1 horizontal to 3 vertical. The depth of flow of water is 2.4 m and value Chezy's constant $C = 50$. The slope of the bed of the channel is given 1 in 4000. (8)
