

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, APRIL-2022**

HYDRAULICS

[Maximum marks: 100]

(Time: 3 Hours)

PART – A

Maximum marks : 10

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

1. Define the term specific gravity.
2. State Pascal's law of fluid pressure.
3. Name the different types of orifices.
4. List the various components of a hydroelectric power plant.
5. Distinguish between uniform and non-uniform flow.

(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 absolute pressure, gauge pressure and vacuum pressure.
2. Explain the working of a Pelton wheel with the help of a neat sketch.
3. A circular tank of diameter 4m contains water up to a height of 5m. The tank is provided with an orifice of diameter 0.5m at the bottom. Find the time taken by water to fall from 5m to 2m.
4. Derive the formula for finding discharge over a rectangular notch.
5. Find the discharge over a triangular notch of angle 60° when the head over the notch is 0.3m. assume $C_d = 0.6$.
6. Describe the major and minor losses of head of water flowing through pipes.
7. Find the head lost due to friction in a pipe of diameter 300mm and length 50m, through which water is flowing at a velocity of 3m/s using chezy's formula for which $C=60$

(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) Derive Bernoulli's theorem of total energy of liquid in motion. Also state its limitations (10)

(b) Water is flowing through a pipe having diameters 20cm and 10cm at sections 1 and 2 respectively. The rate of flow through the pipe is 35 litres/s. the section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24N/cm^2 , find the intensity of pressure at sections 2. (5)

OR

IV.(a) A vertical sluice gate is used to cover an opening in a dam. The opening is 2m wide and 1.2m high. On the upstream of the gate, the liquid of specific gravity 1.45 lies up to a height of 1.5m above the top of the gate, whereas on the down stream side, water is available up to a height touching the top of the gate. Find the resultant forces acting on the gate and position of center of pressure. (9)

(b) Water flows through a pipe AB 1.2m diameter at 3m/s and then passes through a pipe BC 1.5 diameter. At C, the pipe branches. Branch CD is 0.8m in diameter and carries one third of the flow in AB. The flow velocity in branch CE is 2.5m/s. find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter if CE. (6)

UNIT-II

V. (a) Describe the experimental determination of Co-efficient of velocity, co-efficient of discharge and co-efficient of contraction. (8)

(b) A rectangular orifice, 1.5 m wide and 1.0 m dep is discharging water from a tank. If the water level in the tank is 3.0 m above the top edge of the orifice, find the discharge through the orifice. Take $C_d = 0.6$. (7)

OR

VI. (a) Describe the purpose of a draft tube. List the different types of draft tubes. (7)

(b) Describe the different parts of a centrifugal pump along with their functions. (8)

UNIT-III

VII. (a) Derive a formula for finding discharge over a triangular weir. (8)

(b) A weir 36 m long is divided into 12 equal bays by vertical posts each 60cm wide.

Determine the discharge over the weir if the head over the crest is 1.20m and velocity of approach is 2m/s. (7)

OR

VIII.(a) Water is flowing in a rectangular channel of 1m wide and 0.75m deep. Find the discharge over a rectangular weir of crest length 60cm if the head of water over the crest of weir is 20cm and water from the channel flows over the weir. Take $C_d = 0.62$. neglect end contractions. Take velocity of approach into consideration. (8)

(b) Find the discharge through a trapezoidal notch which is 1m wide at the top and 0.4m at the bottom and is 30cm in height. The head of water on the notch is 20cm. Assume C_d for rectangular notch as 0.62 while that for triangular portion is 0.60. (7)

UNIT-IV

IX. (a) Derive Darcy's formula for friction loss in pipe flow. (8)

(b) Write a note on hydraulic grade line and total energy line. (7)

OR

X. (a) Derive conditions for most economical Trapezoidal channel section. (8)

(b) A trapezoidal channel has a side slopes of 1 horizontal to 2 vertical and the slope of the bed is 1 in 1500. The area of the section is 40m^2 . Find the dimensions of the section, if it is most economical. Determine the discharge of the most economical section if $C = 50$. (7)
