

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2019**

HYDRAULICS

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. Define specific gravity and specific weight.
2. Distinguish between simple manometer and differential manometer.
3. Name the types of energy of a liquid in motion. Write their relation.
4. Define End contraction.
5. List the main components of hydro electric power plant.

(5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. An isosceles triangular plate of base 3 metres and altitude 3 metre is immersed vertically in an oil of specific gravity 0.8. Determine the total pressure and centre of pressure of the plate.
2. Derive an expression for finding discharge through a venturimeter.
3. A swimming pool 10 metres long and 6 metres wide holds water to a depth of 1.80 metres. If the water is discharged through an opening at the bottom of the pool of an area 0.15 square metre, find the time taken to empty the pool.
4. With the help of a neat sketch, describe the working of jet pump.
5. Discuss the advantages of triangular notch over rectangular notch.
6. Explain the term end contraction, discuss the effect of it over discharge.
7. Explain about water hammer and its effects.

(5×6 = 30)

PART — C

(Maximum marks : 60)

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

UNIT — I

- III (a) Explain the types of flow of fluid. 6
- (b) An inverted U-tube manometer is connected with two pipes which carries an oil of specific gravity 1.2 and 0.8 respectively. The fluid in the manometer is an oil of specific gravity 0.7. Find the pressure difference between pipes. 9

OR

- IV (a) Derive an equation for total pressure and centre of pressure of an inclined Plane surface submerged in liquid. 9
- (b) A sub-marine moves horizontally in sea and has its axis 15m below the surface of water. A pitot tube properly placed just in front of the sub-marine and along its axis is connected to the two limbs of a U-tube containing mercury. The difference of mercury level is found to be 170mm. Find the speed of sub-Marine knowing the sp.gr. of mercury is 13.6 and that of sea water is 1.026. 6

UNIT — II

- V (a) Differentiate between Impulse turbine and Reaction turbine. 7
- (b) An external cylindrical mouth piece of diameter 150mm is discharging water under a constant head of 6m. Determine the discharge and absolute pressure head of water at vena-contracta. Take $C_d = 0.855$ and C_c for vena-contracta = 0.6 Atmospheric pressure head is 10.3m of water. 8

OR

- VI (a) Explain with neat sketch the function of draft tube. What are the main classifications ? 7
- (b) A 3m high tank standing on the ground is kept full of water. There is a small orifice in its vertical side with its centre at depth h metres below the free surface of liquid in the tank. Find the value of h so that the liquid strikes the ground at the maximum distance from the tank. Assume $C_v = 0.97$, also calculate maximum value of horizontal distance. 8

UNIT — III

- VII (a) Draw the hydroelectric installation layout and explain. 7
- (b) A trapezoidal notch 120cm wide at the top and 45cm at the bottom is 30cm high. Find the discharge through the notch, if the head of water is 22.5cm. Take coefficient of discharge as 0.6. 8

OR

- VIII (a) Discuss the difference between notch and weir. 8
- (b) A 24m long weir is divided into 8 equal bays by vertical posts each 0.2m wide. If the head over the weir is 900mm and velocity of approach 2.2m/s, determine the discharge over the weir using (1) Francis formula and (2) Bazin's formula. 7

UNIT — IV

- IX (a) Derive an expression for loss of head due to friction in pipes. 7
- (b) A trapezoidal earthen channel has side slope 2 vertical to 3 horizontal and discharging water at the rate of $15\text{m}^3/\text{s}$ at a velocity 3m/s so that the concrete lining for the bed and sides is minimum. Calculate the area of lining required for 100m length of canal. 8

OR

- X (a) Explain about most economical section of channel. 7
- (b) A pipeline 40m long is connected to a water tank at one end, and discharges freely into the atmosphere at the other end. For the first 25m of its length from the tank, the pipe is 15cm dia. And its diameter is suddenly enlarged to 30cm. The height of water level in the tank is 8m above the centre of the pipe. Considering all losses of head which occur, determine the rate of flow. Assume pipe friction coefficient $f = 0.04$. 8
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