

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017**

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 intensity of pressure and pressure head.
2. Define the term velocity approach.
3. Derive the relation among C_d , C_c and C_v .
4. Write down the equation for loss of head at entrance and exit in a pipe flow.
5. Write any two function of Draft tube in a waterway system of hydroelectric power plant. (5×2 = 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. Calculate the height of mercury column equivalent to a gauge pressure 150 kpa.
2. Explain with a neat sketch, how the positive and negative pressure measuring by a simple manometer.
3. Write any 6 differences between centrifugal pump and reciprocating pump.
4. Write down the equation for discharge through a triangular notch. List any 4 advantages of triangular notch over rectangular notch.
5. Write down the Kutter's and Manning's formula for Chezy's constant C.
6. Define the term most economical cross section of channels. Derive an expression for most economical section of a rectangular channel.
7. What is the use of pitot tube ? Derive an expression for its use. (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) Define the terms total pressure and centre of pressure on a vertically immersed surface in a liquid. Derive an expression for total pressure on a vertically immersed rectangular surface. 7
- (b) A vertical sluice gate 4meters wide and 2m deep is hinged at top. A liquid of specific gravity 1.5 stands on upstream side of the gate upto a height of 3.5 meters above the top edge of the gate and water on the downstream side up to the top edge of the gate.

Find : (i) resultant pressure acting on the gate.

(ii) point at which the resultant pressure acts. 8

OR

- IV (a) State and prove Bernoulli's equation. List any two application. 8
- (b) A 150×75 mm venturymeter is connected in a pipe discharging water, which is inclined at an angle of 45° with the horizontal. The throat is 1.5m away from the entrance. Find the discharge through venturymeter, if the mercury gauge shows a deflection of 175mm and coefficient of venturymeter as 0.95. 7

UNIT — II

- V (a) Differentiate between orifice and mouthpieces regarding their shape and quantity of Discharge with neat sketches. 8
- (b) A circular tank of 4m diameter contains 5m deep water. An orifice of 400mm diameter is provided at its bottom. Find the time taken to fall the water level from 5m to 2m. Take $cd = 0.6$. 7

OR

- VI (a) Derive an expression for time taken for emptying a tank through an orifice at its bottom. 7
- (b) Explain the functions of different parts of a reciprocating pump with neat labeled sketch. 8

UNIT — III

- VII (a) Explain with neat sketches - narrow crested, broad crested weir, submerged weir and Cippoletti weir. 7
- (b) Determine the maximum discharge over a broad crested weir 60meters long having 0.6m height of water above its crest. Take the coefficient of discharge as 0.59. Also determine the new discharge over the weir, considering the velocity of approach. Channel at the upstream side of the weir has cross sectional area of 45 m^2 . 8

OR

Marks

- VIII (a) A submerged sharp crested weir 0.8 meter high stands clear across a channel having vertical sides and a width of 3 meters. The depth of water in the channel of approach is 1.25 meter. And 10 meter downstream from the weir, the depth of water is 1 meter. Determine the discharge over the weir in liters/second. Take C_d as 0.6. 7
- (b) Sketch the layout of a typical waterway system of hydro-electric power plant showing component part and write down any two functions two components. 8

UNIT — IV

- IX (a) Derive Darcy's formula for loss of head due to the friction in a pipe line. 7
- (b) Find the maximum power that can be transmitted by a power station through a hydraulic pipe of 3 kilometers long and 200mm diameter. The pressure of water at the power station is 1500 kPa. Take $f = 0.01$. 8

OR

- X (a) Differentiate :
- (i) Uniform flow and non-uniform flow.
 - (ii) Laminar flow and turbulent flow.
 - (iii) Hydraulic gradient line and total energy line. 7
- (b) A trapezoidal channel has a side slope of 2 vertical to 3 horizontal. It discharge water at a rate of 20 cumec with bed slope 1 in 2000. Design the discharge for its best form. Use manning's formula, take $N = 0.01$. 8
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