

FOURTH SEMESTER DIPLOMA EXAMINATION IN CIVIL ENGINEERING—
OCTOBER, 2013

HYDRAULICS

[Time : 3 hours

(Maximum marks : 100)

Marks

PART—A

(Maximum marks : 10)

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

1. Define specific gravity and specific weight.
2. What is meant by centre of pressure ?
3. What is Borda's mouth piece ?
4. Explain end contraction of a weir.
5. What is meant by water hammer ?

(5×2=10)

PART—B

(Maximum marks : 30)

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

1. What are the energies possessed by a flowing liquid ? Explain.
2. The vacuum pressure of a point A in a pipe line carrying water was measured by a U-tube manometer. The deflection of mercury between the limbs was 5cm and the free surface of mercury in the open limb was 10 cm below A. Find the pressure at A.
3. Define the hydraulic coefficients.
4. What is meant by priming of a centrifugal pump ?
5. Differentiate between Notch and Weir.
6. Explain classification of weir.
7. Explain uniform flow and non uniform flow in open channel.

(5×6=30)

PART—C
(Maximum marks : 60)

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

UNIT—I

- III (a) A rectangular plate $1.2\text{m} \times 0.80\text{m}$ is immersed at an inclination of 30° to the free surface of water. The top 0.80m side is parallel to and at a depth of 0.70m below the free surface. Calculate resultant water pressure and depth of centre of pressure. 8
- (b) With the help of a sketch, describe venturimeter. 7

OR

- IV (a) Derive an equation for total pressure on an inclined immersed plane surface. 8
- (b) Two pressure points in a pipe carrying water are connected to an inverted U tube. The U tube has oil of relative density 0.8 above water. If the difference of water column in the tube is 20cm , find the differential pressure in terms of Pascal. 7

UNIT—II

- V (a) Derive an expression for discharge through a large rectangular orifice. 8
- (b) A jet of water issuing from an orifice of area 0.001m^2 at a depth of 2.75m below the constant water level falls 0.50m vertically in a horizontal distance of 2.25m . The water is collected in a collecting tank of size $0.60\text{m} \times 0.45\text{m}$ in 120 seconds, the rise in water level in the collecting tank is 0.20m . Find :
- (i) Coefficient of velocity (iii) Coefficient of contraction. 7
- (ii) Coefficient of discharge

OR

- VI (a) Explain the working of a centrifugal pump. 8
- (b) A Borda's mouth piece of 100mm diameter is discharging water under a head of 4m . Find the discharge through the mouth piece in litres per minute, when :
- (i) The mouth piece is running free. 7
- (ii) The mouth piece is running full.

UNIT—III

- VII (a) With a coefficient of discharge 0.6 , a rectangular notch 0.25m wide discharges 30 litres/second. Find the head causing flow. 8
- (b) Write short notes on :
- (i) Sharp crested weir. (iii) Submerged weir. 7
- (ii) Broad crested weir.

OR

- VIII (a) Estimate the discharge over a broad crested weir of length 8m when the head of water on the upstream and downstream side are 1.0m and 0.8m respectively. Assume $c_d = 0.62$. 8
- (b) Draw the layout of a hydroelectric power plant. 7

UNIT—IV

- IX (a) Derive Darcy's formula for the loss of head due to friction in a pipe line. 8
- (b) A trapezoidal channel is 5m wide at bottom. The side slopes are 1:1. The bed fall is 1 in 1600 and C is 50. Find the discharge when the depth of flow is 1m. 7

OR

- X (a) A rectangular channel has economical section. The discharge through the channel is $74.60\text{m}^3/\text{second}$. The bed fall is 1 in 1600. Find the dimension of the channel. Take $C = 50$. 8
- (b) Write short notes on :
- (i) Hydraulic gradient line.
- (ii) Total energy line. 7