

TED (10)-3027

(REVISION—2010)

Reg. No. ....

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FOURTH SEMESTER DIPLOMA EXAMINATION IN CIVIL ENGINEERING  
OCTOBER, 2012

HYDRAULICS

[Time : 3 hours

(Maximum marks : 100)

PART—A

Marks

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

1. Define surface tension.
2. Explain the functions of a turbine.
3. Distinguish between partially and fully submerged orifices.
4. Differentiate between narrow and broad crested weir.
5. What is the difference between open channel flow and pipe flow? (5×2=10)

PART—B

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

1. A U-tube differential manometer is connected to pipe A containing water under a pressure of  $0.15 \text{ N/mm}^2$  and pipe B containing oil of specific gravity 0.9 under a pressure of  $0.2 \text{ N/mm}^2$ . Find the difference in mercury level if pipe B is 40 cm below pipe A and the level of mercury in the limb connected to pipe A is 10 cm below pipe B.
2. Derive the equation of continuity.
3. A partially submerged orifice on the side of a large tank is rectangular in shape, breadth = 1 m and depth = 0.6 m. The constant level of water on the inside of tank is 2.7 m above the bottom edge and on the outer side is 0.3 m above the bottom edge. Find the discharge in lit/sec if  $C_d = 0.62$ .
4. Compare and contrast reciprocating and centrifugal pumps.
5. A discharge of 400 cumecs is flowing over a Cippolett weir of 40 m length. Find the depth of water above the sill of weir if  $C_d = 0.63$ .
6. What are the merits and demerits of Hydroelectric power projects?
7. Find the discharge through a pipe of diameter 200 mm, length 500 m and loss of head due to friction = 50.4 m and  $f = 0.01$ . (5×6=30)

## PART—C

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

## UNIT—I

- III (a) Convert a gauge pressure of 15 m into absolute pressure in meters of water and  $\text{kN/m}^2$ . 3
- (b) A water tank  $1.5 \text{ m} \times 1.5 \text{ m}$  contains water to a depth of 2 m. Find the intensity of pressure on the bottom of the tank and total pressure on any side of the tank. 4
- (c) The section of a tapering pipe varies from 150 mm to 100 mm. The centre of larger end is at a height of 20 m and the centre of smaller end is 16 m above the datum respectively. The pressure of water at the larger section is  $0.2 \text{ N/mm}^2$  and the velocity of flow at the larger section is 1.2 m/sec. Determine the velocity and pressure at the smaller section. 8

OR

- IV (a) An equilateral triangular plate of 1.5 m side is vertically immersed in water such that its CG is at a depth of 4.5 m below the free surface of water. Find total pressure acting on the plate. 7
- (b) A venturi meter fitted in a horizontal pipe of 90 mm diameter has a throat diameter of 30 mm. Find the rate of flow in lit/sec if venturi head is 450 mm of water. Assume coefficient of the venturi meter as 0.97. 8

## UNIT—II

- V (a) Distinguish between : (i) small and large orifice 8  
(ii) Sharp edged and bell mouthed orifice. 8
- (b) Explain the working of a single acting reciprocating pump. 7

OR

- VI (a) A pipe of cross sectional area  $0.09 \text{ m}^2$  is suddenly enlarged to  $0.36 \text{ m}^2$  C/S area. The discharge is  $0.285 \text{ m}^3/\text{sec}$ . Pressure at the smaller pipe is  $85 \times 10^3 \text{ Pa}$ . Find : 8  
(i) Velocity at the smaller end (iii) Loss of head due to sudden enlargement  
(ii) Velocity at the larger end (iv) Pressure at enlarged end.
- (b) Write short notes on : (i) impeller (iii) Suction pipe with foot valve. 7  
(ii) Casing

## UNIT—III

- VII (a) A broad crested weir of 40 m has a head of 0.65 m above the crest. Assuming velocity of approach = 1.5 m/sec and  $C_d=0.6$ . Compute the maximum discharge. 8
- (b) What are the components of a hydro electric power generating project ? 7

OR

- VIII (a) A trapezoidal weir with bed width of 9 m and side slope of 1:1 discharge the surplus water from a tank with a head of 0.45 m. If the same discharge flows over a rectangular weir with same head, what will be the length of weir required ? Account for end contractions and assume  $C_d$  as 0.60 for both weirs. 8
- (b) Write short notes on :  
(i) High head power plants (ii) Low head power plants. 7