

TED (10)-3027

(REVISION-2010)

Reg. No.

Signature

FOURTH SEMESTER DIPLOMA EXAMINATION IN CIVIL ENGINEERING
MARCH, 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. Sketch a U- tube differential manometer and mark the components.
2. Explain the functions of air vessel in a reciprocating pump.
3. What is a Cippoletti weir ?
4. Differentiate between laminar and turbulent flow.
5. What do you mean by most economical channel section ?

(5×2=10)

PART—B

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

1. Find the total pressure and position of centre of pressure acting on a circular plate of 1.5 m diameter immersed in water at an angle of 15° to the horizontal with its top edge 1 m below the free water surface.
2. What are the limitations of Bernoulli's theorem ?
3. A sharp edged orifice of 25 mm diameter is discharging water under a constant head of 4.5 m. The jet drops 1 m over a horizontal distance of 2.7 m. The rate of discharge is 1.925 lit/sec. Find C_d , C_v and C_c .
 *$C_v = 0.64$
 $C_d = 0.42$
 $C_c = 0.66$*
4. Explain the need and functions of governors in turbines.
5. A trapezoidal notch 1.5 m at top and 0.90 m wide at bottom is 0.45 m high. Find discharge if head of water is 0.35 m and C_d is 0.60.
 $4 \text{ m}^3/\text{sec}$
6. List any three minor losses of head in pipes and the corresponding equations to find loss of head.
7. State the three conditions required for a trapezoidal channel to be most economical section.

(5×6=30)

PART—C

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

UNIT—I

- III (a) What are the different types of pressure measuring mechanical gauges? Explain. 7
 (b) Derive an equation to measure the quantity of water flowing through a venturimeter. 8

OR

- IV (a) State and prove Bernoulli's Theorem. 8
 (b) A circular plate of 2.1 m diameter is immersed in water with its top and bottom edges at depths of 1 m and 2.5 m respectively. Find the centre of pressure and total pressure on the plate. 7 *2.1 m*

UNIT—II

- V (a) Find the discharge through a partially submerged orifice with a head of 1.5 m and 0.25 m from the sill of the orifice. The length of orifice is 0.9 m and depth is 0.45 m. Take $C_d = 0.58$. 8
 (b) What is a multistage pump? What are the merits of it? 7

OR

- VI (a) Find the loss of head due to reduction of the diameter from 300 mm to 150 mm in a horizontal pipe with discharge of 45 lit/sec. taking $C_c = 0.60$. 7 *0.12 m*
 (b) Classify turbines and give an example for each type. 8

UNIT—III

- VII (a) A submerged weir of length 2.5 m has a head of 0.25 m on the upstream and 0.1 m on the downstream above the crest. Find discharge if $C_d = 0.6$ for submerged portion and $C_d = 0.8$ for free portion. 8 *0.6 m³/s*
 (b) Enumerate various objectives or purposes of a multipurpose Hydroelectric projects. 7

OR

- VIII (a) The discharge over rectangular notch having a length = 100 cm, head = 15 cm and $C_d = 0.6$ is allowed to pass through a right angled triangular notch with $C_d = 0.55$. Find the depth of flow of water in the triangular notch. 8 *0.76 m*
 (b) Explain with sketches :
 (i) Surge tank (ii) Penstock in power generating systems. 7

UNIT—IV

- IX (a) A main pipe discharging $3\text{m}^3/\text{sec}$. is divided into two parallel pipes of diameter 800 mm and 600 mm for equal length. Find the discharge in each parallel pipe if they have same coefficient of friction and same loss of head. 8
 (b) Derive Chezy's formula for discharge through open channel. 7

OR

- X (a) Write short notes on :
 (i) Hydraulic gradient line (iii) Hydraulic mean depth 8
 (ii) Total energy line (iv) Water hammer.
 (b) A channel has a width of 3 m, side slope of 1 V to 2 H, bed slope of 1 in 700 and water depth of 1.1 m. Calculate the discharge taking $N = 0.03$ in Manning's formula. 7