TED (15/19) -4011
(Revision- 2015/19)

N21-01701

Reg.No…….....
Signature. .....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE –NOVEMBER -2021.

HYDRAULICS

(Maximum Marks : 75) [Time : 2.15 hours]

PART–A

Marks

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

1. Define the terms: Mass density, Specific weight, Specific gravity and Viscosity of a fluid.
2. Define the terms total pressure and center of pressure.
3. Define the various hydraulic coefficients.
4. Define velocity of approach.
5. Differentiate between hydraulic gradient line and total energy line. (3x2=6)

PART - B

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

1. Distinguish among atmospheric pressure, gauge pressure and absolute pressure.
2. A pipe of diameter 200mm conveys 2500 *l* of water per minute and has a pressure of 20kN/m^2 at a certain section. Find the total energy head with respect to a datum 5m below the pipe.
3. Differentiate between orifices and mouthpieces. List the types of mouthpieces.
4. List the main components of Francis turbine. Also describe the purpose of a draft tube.
5. Sketch a typical hydroelectric installation and name the important parts.
6. Describe the effect of water hammer.
7. Differentiate between flow through pipes and flow through open channels.

[4x6 =24]

PART - C

(Answer **any of the three units** from the following. Each full question carries 15 marks)

UNIT I

III (a) A plate 0.025 mm distant from a fixed plate moves at 60 cm/s and requires a force of 2 N per unit area that is, 2 N/m^2 to maintain this speed. Determine the fluid viscosity between the plates. (6)

(b) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left from the centre of pipe is 15 cm below. (9)

OR

IV (a) Derive Bernoulli's theorem of total energy of liquid in motion and state the limitations. (10)

(b) Water is flowing into a horizontal tapered pipe of diameter 200mm at the larger end and 100mm at the smaller end. The velocity of water at the larger end is 4.5 m/s. Determine the rate of discharge and velocity at the smaller end. (5)

UNIT- II

V (a) Differentiate between impulse turbines and reaction turbines. (6)

(b) A rectangular orifice 0.9m wide and 1.2m deep is discharging water from a vessel. The top edge of the orifice is 0.6m below the water surface in the vessel. Calculate the discharge through the orifice if $C_d = 0.6$ and percentage error if the orifice is treated as a small orifice. (9)

OR

VI (a) With neat sketch explain the working of a single acting reciprocating pump. (9)

(b) A circular tank of diameter 1.25 m contains water up to a height of 5m. An orifice of 50mm diameter is provided at its bottom. If Cd = 0.62, Find the height of water above the orifice after 1.5 minutes. (6)

UNIT- III

VII (a) Water is flowing in a rectangular channel of 1 m width and 0.75m depth. Find the discharge over a rectangular weir of crest length 60cm if the head of water over the crest of weir is 20cm and water from the channel flows over the weir. Take Cd=0.62. Neglect end contractions. Take velocity of approach into consideration. (9)

(b) Give a comparison between triangular notch or weir and a rectangular notch or weir. (6)

OR

VIII (a) A weir 36m long is divided into 12 equal bays by vertical posts each 60cm wide. Determine the discharge over the weir if the head over the crest is 1.2m and the velocity of approach is 2m/s. (9)

(b) The head of water over a rectangular weir is 40cm. The length of the crest of the weir with end contraction suppressed is 1.5m. Find the discharge using (i) Francis' formula (ii)Basin's formula. (6)

UNIT – IV

IX (a) Derive Darcy-Weisbatch equation to find the loss of head due to friction in pipe. (10)

(b) Find the velocity of flow and rate of flow of water through a rectangular channel of 5 m wide and 2 m deep when it is running full. The channel is having bed slope of 1 in 3000. Take Chezy's constant, C=50. (5)

OR

X (a) A trapezoidal channel has a side slope of 1 horizontal to 2 vertical and the slope of the bed is 1 in 1500. The area of the section is $40m^2$. Find the dimensions of the section if it is most economical. Determine the discharge of the most economical section if C=50. (8)

(c) A channel of rectangular section is to carry $20m^3$ of water per second with a velocity of 2.5 m/s. Design the most economical section for the channel. Also calculate the necessary slope of the bed of the channel, Take C=60. (7)

****