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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -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. State Pascal's law.
2. Define crest of a weir or notch.
3. Differentiate between coefficient of contraction and coefficient of discharge.
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. Water is flowing into a horizontal tapered pipe of diameter 200 mm at the larger end and 100 mm at the smaller end. The velocity of water at the larger end is 4.5m/s. Determine the rate of discharge and velocity at the smaller end.
3. Differentiate between orifices and mouthpieces. List the types of mouthpieces.
4. Describe with sketches the principle of working of pelton wheel.
5. Explain the effect of end contraction.
6. Describe the effect of water hammer.
7. Describe the minor losses of head of water flowing through pipes.

[4x6 =24]

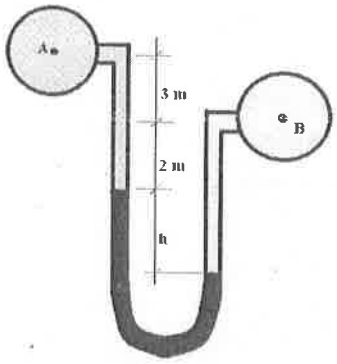
PART - C

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

UNIT I

III (a) Explain on the energy possessed by a liquid in motion. (6)

(b) A differential manometer is connected at the two points A and B of two pipes as shown in figure. The pipe A contains a liquid of specific gravity 1.5 while pipe B contains a liquid of specific gravity 0.9. The pressures at A and B are 1 kg f/cm^2 and 1.8 kg f/cm^2 respectively. Find the difference in mercury level in the differential manometer. (9)



OR

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

(b) A pipe of diameter 200 mm 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 5 m below the pipe. (5)

UNIT- II

V (a) The head of water over an orifice of diameter 40 mm is 10 m. Find the actual discharge and actual velocity of jet at vena contracta.
Take Cd=0.6 and Cv=0.98. (9)

(b) Differentiate between impulse turbines and reaction turbines. (6)

OR

VI (a) With neat sketch explain the working of a single acting reciprocating pump. (6)

(c) A circular tank of diameter 4 m contains water up to a height of 5m. The tank is provided with an orifice of diameter 0.5m at the bottom. If value of Cd=0.6, find the time taken by water.
(i)To fall from 5m to 2m

(ii)For completely emptying the tank (9)

UNIT- III

VII (a) List the advantages of triangular notch over rectangular notch. (6)

(b) Water is flowing in a rectangular channel of 1m 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)

OR

VIII (a) A weir 36m long is divided into 12 equal bays by vertical posts each 60 cm wide. Determine the discharge over the weir if the head over the crest is 1.2 m 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 pipes. (10)

(b) Find the velocity of flow of water through a rectangular channel 6 m wide and 3 m deep, when it is running full. The channel is having abed slope of 1 in 2000. Take Chezy's constant C=55. (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. (9)

(b) Find the discharge through a rectangular channel of width 2m, having a bed slope of 4 in 8000. The depth of flow is 1.5 m and take the value of N in Manning's formula as 0.012. (6)

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