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(Revision -2010)

N20-R00407

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE – NOVEMBER-2020.

HYDRAULICS

(Maximum Marks : 100) [Time: 3 hours]

Marks

PART – A

(Maximum marks: 60)

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

1. Define Specific gravity and Viscosity.
2. Define Mouthpiece.
3. List four different types of Notches.
4. Define Weir.
5. Define Hydraulic Gradient line. (5 x 2=10)

PART – B

II Answer any five questions. Each question carries 6 marks.

1. A rectangular opening in a vertical reservoir wall is 1m wide and 3.5m deep and its top edge is 9.5m below water level. Find the total pressure on the gate and also its point of application.
2. The diameter of a pipe changes from 150mm at a point 'A' to 100mm at point 'B' which are situated at 20m and 16m respectively above the datum. The pressure at 'A' is 0.2 N/mm^2 and velocity of flow at 'A' is 1.1 m/sec. Neglecting losses between A and B determine the pressure at B.
3. A sharp edged orifice of 20mm diameter is discharging water under a constant head of 4m. The jet drops 1m in a horizontal distance of 3.9m. The measured rate of discharge is 1.725 lit/sec. Find the three hydraulic co-efficients.

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4. A tank has two identical orifices in one of its vertical sides. The upper orifice is 2m below the water surface and the lower one is 4m. below the water surface. Find at what point the two jets will intersect if the co-efficient of velocity is 0.9 for both orifice.
5. Under a laboratory test over a right angled 'V' notch, 40 litres of water is collected in one minute under a head of 45 mm. Calculate the co-efficient of discharge of the notch.
6. Find the most economical cross section of a rectangular channel to carry $0.3m^3$/sec. of water when the bed slope is 1 in 1000. Assume Chezy's C = 60.
7. Water flows through a pipe 15cm. dia. 300mm. long with a velocity of 2.4m /sec. Find the head lost in friction (a) using Darcy's formula, (b) using Chezy's formula. Take the pipe as old one.

(5 x 6=30)

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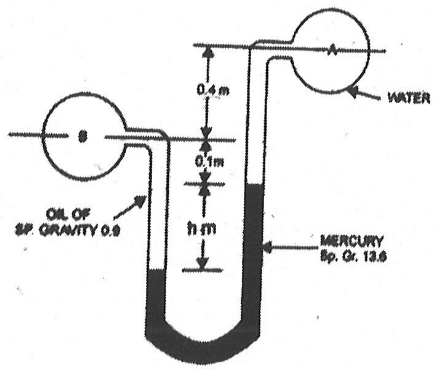
PART C

(Maximum marks: 60)

UNIT-I — Marks

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

III (a) A 'U' tube differential manometer containing mercury is attached on one side to pipe 'A' containing water under a pressure of 0.12 N/mm^2 and the other pipe 'B' contains oil of sp. gravity 0.9 under a pressure of 0.23 N/mm^2. Find the mercury level difference.

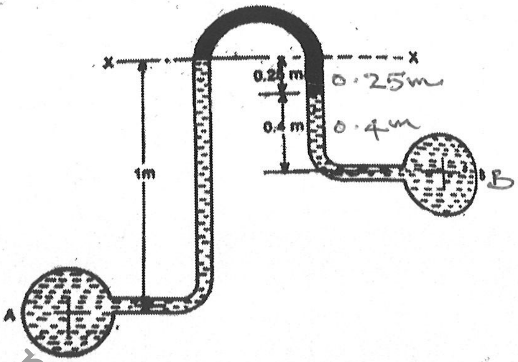


8

(b) A circular plate 2.5m in diameter is immersed in water with its least and greatest depths being 1 m and 3 m respectively. Find the total pressure on the plate and the centre of pressure. 7

OR

IV (a) An inverted differential manometer is connected between two pipes A and B as shown in figure. Pipe 'A' contains a liquid of sp. gravity 1.5 while the pipe 'B' contains an oil of sp.gravity 0.9. The manometric liquid has a sp. gravity of 0.8. Determine the pressure in pipe 'B' if the pressure in pipe 'B' if the pressure in pipe 'B' if the pressure in pipe 'A' is 0.1 N/mm^2.



8

(b) A vertical pipe line 1 m long tapers from a cross sectional area of 78.5 cm^2 at top to a c/s area of 176.7 cm^2 at bottom. Find pressure at top if the pressure at bottom is 0.1 N/mm^2. The velocity of water at bottom is 1 m/sec. 7

UNIT – II

V (a) A circular tank of diameter 3m contains water up to a height of 4m. The tank is provided with an orifice of diameter 0.4m at the bottom. Find the time taken by water (1) to fall from 4m to 2m. (2) or completely emptying the tank. Take cd=0.6. 8

(b) A rectangular orifice of 1.5m wide and 1.2m deep is fitted in one side of a large tank. The water level on one side of the orifice is 2m above the top edge of the orifice, while on the other side of the orifice, the water level is 0.4m below its top edge. Calculate the discharge through the orifice if Cd=0.62. 7

OR

VI (a) Compare the Centrifugal pump with Reciprocating pump on different aspects. 8

(b) An internal mouthpiece of dia 60mm is discharging water under a constant head of 9m. Find the discharge in litres/sec. If the mouthpiece is (1) running free (2) running full. 7

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UNIT - III

VII (a) A trapezoidal notch having 0.8m base has side inclined at 30^0 to the horizontal. Find the discharge over the notch under a head of 0.4m. Take Cd for rectangular Portion=0.62 and that for triangular portion as 0.60. 8

(b) Find the discharge over a rectangular weir of length 80m. The head of water over the weir is 1.2m. The velocity of approach is given as 1.5m/s. Take Cd= 0.6. 7

OR

VIII (a) Sketch the layout of a hydroelectric power plant. 8

(b) Water flows over a rectangular notch of 1m length over a depth of 15cm. Then the Same quantity of water passes through a right angled triangular notch. Find the depth of the water through the notch. Take co-efficient of discharges for rectangular and triangular notches as 0.62 and 0.59 respectively. 7

UNIT – IV

IX (a) Water is flowing through a pipe 1.5KM long and 1m diameter with a velocity of 1m/sec. Find the head lost due to friction using Chezy's formula. Take C= 64. 8

(b) Calculate the depth of water for maximum velocity in a circular open channel of 4m. dia. Also find the discharge at that depth when the slope of the bed is 1 in 200. Take C=60. 7

OR

X (a) Find the best slope of trapezoidal channel of bed width 5m, depth of 3m and side slopes of 3H to 4V, when the discharge through the channel is 45 m^3/sec. Take Chezy's constant as 60. 8

(b) A 2 km long water main has to carry a discharge of 0.5 m^3/sec. If the max. allowable loss of head due to friction is 25 m. Find minimum dia required. Use Darcy's equation assume f = 0.008 neglect minor loss. 7

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