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C20-C-303

7226

BOARD DIPLOMA EXAMINATION, (C-20)

FEBRUARY/MARCH — 2022

DCE - THIRD SEMESTER EXAMINATION

HYDRAULICS

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. List any six properties of a fluid.
2. Define gauge pressure and vacuum pressure.
3. Define uniform flow and non-uniform flow.
4. What is meant by vena-contracta?
5. List the types of notches based on the shape of opening.
6. A weir 8 m long has a constant head of water 350 mm, taking the coefficient of discharge as 0.61; determine the discharge over the weir.
7. State the formula for head loss due to sudden contraction and head loss at entrance of the pipe.
8. Define the terms wetted perimeter and hydraulic mean depth.
9. Write about priming of a centrifugal pump.
10. List any six components of a hydroelectric power plant.

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PART—B

8×5=40

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **eight** marks.
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

- 11.** (a) A pipe contains oil of specific gravity 0.8. A differential manometer connected between two points *A* and *B* of the pipe shows a difference of mercury level as 20 cm. Find the difference of pressure at the two points.

(OR)

- (b) A circular plate of diameter 1.5 m is placed inclined to the water surface. Its greatest and least depths below the surface are 2 m and 1 m respectively. Find the total pressure and position of the centre of pressure.

- 12.** (a) An internal mouthpiece of 80 mm diameter is discharging water under a constant head of 8 m. Find the discharge through a mouthpiece when, (i) mouthpiece is running full and (ii) mouthpiece is running half.

(OR)

- (b) A circular tank of diameter 3 m contains water up to a height of 4 m. The tank is provided with an orifice of diameter 0.4 m at the bottom. Find the time taken by water, (i) to fall from 4 m to 2 m and (ii) for completely emptying the tank. Take $C_d = 0.6$

- 13.** (a) A broad crested weir 50 m long has 70 cm height of water above the crest. Calculate the max. discharge over the weir, if the velocity of approach is 1.5 m/sec. Assume C_d as 0.62. Neglect end contractions.

(OR)

- (b) Water passing over a rectangular notch flows subsequently over a right angled triangular notch. The length of the rectangular notch is 0.6 m and its C_d is 0.62. If the C_d of triangular notch is 0.58, what will be the head through the triangular notch when the head over the rectangular notch is 0.15 m?

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14. (a) Three pipes of same length L , diameter D , and friction factor f are connected in parallel. Determine the diameter of the pipe length L and friction factor f which will carry the same discharge for the same head loss. Use Darcy's formula.

(OR)

- (b) A horizontal pipe of diameter 500 mm is suddenly contracted to a diameter of 200 mm. The pressure intensities in the large and smaller pipe is given as 13.734 N/cm^2 and 11.772 N/cm^2 respectively. Find the loss of head due to contraction if $C_c = 0.62$. Also determine the rate of flow.
15. (a) Trapezoidal channel has side slope 2 vertical to 1 horizontal with a bed slope 1 in 2000. The area of the section is 40 m^2 . Find the dimensions of the section, if it is most economical section. Determine the discharge through the most economical section. Take $C = 50$.

(OR)

- (b) A rectangular channel 6 m wide carries water at a velocity of 1.535 m/sec . The depth of flow in the channel is 3 m. Find the bed slope of the channel. Assume Manning's coefficient n as 0.027 .

PART—C

$10 \times 1 = 10$

- Instructions :** (1) Answer the following question.
(2) The question carries **ten** marks.
(3) Answer should be comprehensive and criterion for valuation is the content but not the length of the answer.

16. A trapezoidal channel 2 m wide at the bottom and 1 m depth has side slopes 1:1. Determine (a) total pressure and (b) centre of pressure on the vertical gate closing the channel when it is full of water.

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