

7226

BOARD DIPLOMA EXAMINATION, (C-20)

NOVEMBER/DECEMBER—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. Define the terms surface tension and capillarity.
2. State the relation between atmospheric pressure, gauge pressure and absolute pressure.
3. Define laminar flow and turbulent flow.
4. List any three types of mouthpieces with respect to diameter.
5. Define (a) notch and (b) weir.
6. A weir 12 m long has a constant head of 300 mm. Taking C_d as 0.62, determine the discharge over the weir.
7. State any two minor losses in pipes with formulae.
8. State Manning's formula and name the symbols.
9. Write any three functions of a draft tube.
10. Sketch the layout of a hydroelectric power plant.

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- 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) The end gates of a lock are of 10 m height at an included angle of 120° when closed. The width of the lock chamber is 6 m and each gate is supported on two hinges placed at 500 mm from the top and bottom of the gate. If the water levels are 6 m and 4.2 m on upstream and downstream sides respectively, determine the magnitudes of forces on the hinges due to water pressure.

(OR)

- (b) Determine total pressure and centre of pressure of isosceles triangular plate of base 4 m and altitude 4 m when it is immersed vertically in an oil of specific gravity 0.9. The base of the plate coincides with free surface of oil.

- 12.** (a) A sharp edged orifice of 20 mm diameter is discharging water under a constant head of 4 m. The jet drops 1.0 m in a horizontal distance of 3.9 m. When the measured rate of discharge is 1.725 lit/sec, find the three hydraulic coefficients.

(OR)

- (b) An internal mouthpiece of 80 mm diameter is discharging water under a constant head of 4.0 m. Find the discharge through the mouthpiece, when (i) the mouthpiece is running free and (ii) the mouthpiece is running full.

- 13.** (a) 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 coefficient of discharge is 0.62. If the coefficient of discharge of right-angled triangular notch is 0.59, what will be the head through the triangular notch when the head over rectangular notch is 0.15 m?

(OR)

- (b) A broad crested weir 20 m long has a head of 700 mm over the crest. The width of approach channel is 40 m and its depth below the crest of weir is 600 mm. Calculate the discharge over the weir (i) by considering velocity of approach and (ii) by neglecting velocity of approach. [Take C_d as 0.95]

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14. (a) Water flows through a 20 cm diameter and 60 m long pipe with a velocity of 2.5 m/sec. Calculate the loss of head due to friction by using (i) Darcy's formula and (ii) Chezy's formula.

(OR)

- (b) Two reservoirs are connected by a pipeline 22 m long consisting of two pipes, one of 15 cm diameter and length 6 m and the other of diameter 22.5 cm and 16 m length. If the difference of water levels in the two reservoirs is 6 m, calculate the discharge considering losses. Take $f = 0.04$

15. (a) 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 $n = 0.027$.

(OR)

- (b) A trapezoidal channel has side slopes of 1 horizontal to 2 vertical and the slope of the bed is 1 in 1500. The area of section is 40 m². Find the dimensions of the section, if it is most economical. Also determine the discharge of the most economical section, if $C = 50$.

PART—C

10×1=10

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

- * 16. A tank has two identical orifices in one of its vertical sides. The upper orifice is 4 m below the water surface and lower one is 6 m below the water surface. If C_d for both orifices is 0.98, find the point of intersection of two jets.

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