C20-C–303

7226

BOARD DIPLOMA EXAMINATION, (C-20)

MAY—2023

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 viscosity and kinematic viscosity. 1½+1½

2. State the relation among atmospheric pressure, gauge pressure and absolute pressure. 1+1+1

3. State any three limitations of Bernoulli's theorem. 1+1+1

4. What are *(a)* coefficient of contraction and *(b)* coefficient of discharge? 1½+1½

5. Define the terms *(a)* Notch and *(b)* Weir. 1½+1½

6. Calculate the discharge over a rectangular notch having width 2 m and a constant head of 30 cm. Assume *Cd* = 0·62. 3

7. State the expression for the loss of head due to *(a)* sudden enlargement and *(b)* sudden contraction of a pipe. 1½+1½

8. Write any three differences between pipe flow and open channel flow. 1+1+1

9. What is air vessel? State any two functions of air vessel fitted to a reciprocating pump. 1+2

10. List any three functions of a surge tank. 3

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PART—B

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 circular plate 3m in diameter is immersed in water with its greatest and lowest depths below the water surface being 2 m and 1 m respectively. Find the total pressure and depth of centre of pressure. 4+4

(OR)

(b) An Isosceles triangular plate has a base of 50 cm and height of 60 cm. It is immersed vertically such that its apex which is above the base is at a depth 60 cm from the water surface. Find the total pressure and the depth of centre of pressure. 4+4

12. *(a)* An internal mouthpiece of diameter 60 mm is discharging water under a constant head of 9 m. Find the discharge in lit/sec, if the mouthpiece is *(i)* running free and *(ii)* running full. 4+4

(OR)

(b) Calculate the discharge passing through an orifice 80 cm wide and 60 cm deep in the side of a tank. It is having a water level of 3·5 m above the upper edge of the orifice and tail water is 20 cm above the lower edge of the orifice. Take Cd = 0·62. 8

13. *(a)* Find the discharge through a triangular notch under a constant head of 0·25 m if the angle of the notch is 120°. Take Cd = 0·62. 8

(OR)

(b) A rectangular weir of crest width 0·4 m is used to measure the flow of water in a rectangular channel 0·6 m wide of 0·45 m deep. If the water level in the channel is 0·225 m above the weir crest, find the discharge in the channel. Take Cd = 0·63 and take velocity of approach into account. 8

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14. *(a)* Water flows through a pipe 250 cm diameter, 80 m long with a velocity of 3·5 m/sec. Find the loss in friction by using *(i)* Darcy's formula and *(ii)* Chezy's formula. Assume Chezy's constant as 55 and f = 0·01. 8

(OR)

(b) Calculate how much head would be saved in a pipe of 40 m length and 80 mm diameter, if the central 20 m length is replaced by 130 mm diameter pipe, the change of section being sudden. The quantity of water flowing is 12·5 lit/sec. Assume f = 0·01 in each case and consider all losses of head. Take Cc = 0·62. 8

15. *(a)* A rectangular channel 4 m × 2 m (deep) is laid at a slope of 1 in 2000. Find the discharge using Kutter's formula. Take N = 0·25. 8

(OR)

(b) A rectangular channel carries water at a rate of 400 lit/sec. when the bed slope is 1 in 2000. Find the most economical dimensions of the channel, if the Manning's constant N is 0·012. 8

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 trapezoidal channel has side slopes of 2 vertical to 3 horizontal. The discharge in channel is 20 m^3/sec under a bed slope of 1 in 2000. Design the most economical section of channel. Use Manning's formula. Take Manning's coefficient n = 0·01.

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