



C14-C-303

4227

BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2015

DCE—THIRD SEMESTER EXAMINATION

HYDRAULICS

Time : 3 hours ]

[ Total Marks : 80

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PART—A

3×10=30

**Instructions** : (1) Answer **all** questions.

(2) Each question carries **three** marks.

1. Define (a) viscosity and (b) capillarity.
2. Find the pressure head in meters of water for a pressure intensity of  $1 \text{ N/mm}^2$ . Take specific weight of water as  $10 \text{ kN/m}^3$ .
3. State the Bernoulli's theorem. Give its mathematical equation.
4. A convergent mouthpiece is discharging water under a constant head of 9 m. Find the discharge, if diameter of the mouthpiece is 60 mm. Take  $C_d = 1$ .
5. Define (a) nappe and (b) crest of a notch.
6. A rectangular notch 2.5 m wide has a constant head of 400 mm. Find the discharge over the notch, if coefficient of discharge for the notch is 0.62.

- \* 7. Define (a) wetted perimeter and (b) hydraulic radius.
8. State any three differences between pipe flow and open channel flow.
9. Define (a) slip and (b) percentage slip.
10. Write any three functions of a surge tank.

**PART—B**

10×5=50

**Instructions** : (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

11. Determine the total pressure and position of centre of pressure on a circular plate of diameter 1.5 m which is immersed vertically in water such that top of the plate is 3 m below the free surface of water.
12. A horizontal venturi meter 300 mm × 150 mm is used to measure the flow of an oil of specific gravity 0.8. The rate of flow of oil is 0.05 cumec. Find the reading of oil-mercury differential manometer. Take the coefficient of discharge of venturi meter as 0.98.
13. A circular tank of diameter 2 m contains water up to a height of 5 m. An orifice of diameter 500 mm is provided at the bottom of the tank. Find the time required—  
 (a) to lower the water level from 5 m to 2 m;  
 (b) for completely emptying the tank.

Take  $C_d$  as 0.62.

5+5

- \* 14. Water flows through a rectangular notch of 110 mm length and with a depth of flow 140 mm. If the same quantity of water passes through a right angled triangular notch, find the depth of water through the right angled triangular notch. Take coefficient of discharge of rectangular and triangular notches as 0.62 and 0.60 respectively.

- \* **15.** A compound piping system consists of three pipes of lengths 1500 m, 1200 m and 1000 m and of diameters 0.5 m, 0.4 m and 0.3 m respectively, connected in series. It is proposed to convert the system to—
- (a) an equivalent length of 0.4 m diameter pipe;
  - (b) an equivalent size pipe of 3700 m long.
- Find the respective equivalent length and equivalent size. 5+5
- 16.** (a) Write about (i) hydraulic gradient line and (ii) total energy line. 5
- (b) Design most economical section of an earthen trapezoidal channel with velocity of flow 1 m/sec and to discharge  $3 \text{ m}^3/\text{sec}$ . The side slopes of the channel are 1 vertical to 2 horizontal. Take  $C = 55$ . 5
- 17.** Find the most economical cross section of a rectangular channel to carry  $0.25 \text{ m}^3/\text{sec}$  of water when the bed slope is 1 in 1200. Assume  $C = 60$ .
- 18.** Explain about working of a centrifugal pump with the help of a neat sketch.

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