C16–C–404

5617

BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—2018
DCE—FOURTH 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. At a point in a layer of oil, the shear stress is 0.2 N/m^2 and the velocity gradient is 0.25 m/sec/m. Calculate the coefficient of dynamic viscosity.

2. List any three different types of manometer used for pressure measurement.

3. List any three limitations of Bernoulli's equation.

4. Define partially submerged orifice and write the discharge equation denoting what do the terms represent in it.

5. List the type of notches based on their shape.

6. Define Cipolletti weir and state the discharge equation, denoting what do the terms represent in it.

7. Define *(a)* hydraulic grade line and *(b)* total energy line.

8. Write any three differences between pipe flow and channel flow.

9. State the uses of *(a)* foot valve and *(b)* strainer in a centrifugal pump.

10. Write the component parts of hydroelectric power plant.

<center>**PART—B** 10×5=50</center>

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

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

                (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A rectangular plane surface 2·5 m wide and 5 m deep immersed in water in such a way that its longer side of the plane makes an angle of 33º with the free surface of the water. Determine the total pressure and the position of centre of pressure when the upper edge is 1·5 m below the free surface of water.

12. A pipe 320 m long has a slope of 1 in 100 and tapers from 1·3 m diameter at the higher end to 650 mm dia at the lower end. Determine the pressure at the lower end, if the pressure at the higher end is $0·1 \text{ N/mm}^2$ and the discharge through the pipe is 120 lit/sec of water.

13. A small orifice of dia 20 mm is discharging water under a constant head of 100 cm. The water is collected in a tank of size 50 cm×50 cm and the water level rises to 100 mm in 30 seconds. Determine the hydraulic coefficients, if the actual dia of the jet of veena-contract is 15·8 mm.

14. 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 C_d is 0·62. If the C_d of triangular notch is 0·59, what will be the head through the triangular notch when the head over rectangular notch is 0·15 m?

15. Two reservoirs are connected by a pipeline of 22 m long consisting of two pipes one of 15 cm diameter and length of 6 m and the other of 22·5 cm dia and length of 16 m. If the difference of water level in the two reservoirs is 6 m, determine the discharge by considering all major and minor losses. Take, f 0·04.

16. *(a)* The bed slope of a river was found to be 0·000146. If the hydraulic mean depth was 2·1 m and the velocity is 0·84 m/sec, determine the values of Chezy's and Bazin's constants.   2½+2½

(b) A 2 km long water main has to carry a discharge of 0·5 cm^3/sec. If the maximum allowable loss of head due to friction is 25 m, determine the minimum diameter required. Use Darcy's equation. Assume f 0·008. Neglect minor losses.   5

17. Design an economical section of an earthen trapezoidal channel with velocity of flow 1 m/sec and to discharge 3 m^3/sec. The side slopes of the channel are 1 vertical 2 horizontal. Take, C 55.

18. With the help of neat sketch, briefly explain the working of single-acting reciprocating pump.   5+5

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