C09–C–304

3220

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2018

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. At a point in a layer of oil, the shear stress is 0·2 N/m^2 and velocity gradient is 0·25 m/sec/m. Calculate the coefficient of dynamic viscosity.

2. Briefly explain about the piezometer with the help of a neat sketch.

3. What are uniform flow and nonuniform flow? Give one example to each.

4. 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 running full.

5. A broad crested weir 10 m long has a maximum discharge of 10 m^3/sec. Determine the head of water on the upstream side of weir. Take C_d 0 62.

6. What is a notch? Classify the notches based on the shape of opening.

7. State the Darcy-Weisbach equation for head loss due to friction in pipes and name the terms.

8. Differentiate between pipe flow and channel flow in any three aspects.

9. What is a reaction turbine? Give any two examples of reaction flow turbines.

10. Sketch a typical layout of hydroelectric power plant installation.

PART—B 10×5=50

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 body 2 8 m 1 4 m is immersed vertically in water in such a way that its 2·8 m side is parallel to water surface and its top edge is 2·4 m below the free surface. Calculate the *(a)* total pressure, and *(b)* depth of centre of pressure.

12. Water is flowing through a horizontal tapering pipe *AB* with a discharge of 0·5 cumecs. The diameters at *A* and *B* are 300 mm and 600 mm respectively. If the pressure at *A* is 7 m of water, find the pressure at *B* neglecting the losses.

13. Derive an expression for the discharge through a large rectangular orifice.

14. The catchment area of a tank is 5 10^6 m^2. The maximum rainfall in the catchment is 50 mm per hour. Out of this 80% will reach the tank. Find the length of the weir if the head of water is not to exceed 1 m. The weir has to carry piers 1 m wide and 5 m clear span for supporting a superstructure.

15. Two reservoirs are connected by a straight pipe 1·6 km long. For the first half of its length, it is 160 mm diameter and then suddenly reduced to 80 mm dia. The water levels in the two reservoirs differ by 30 m. Tabulate all the losses of head and determine the flow in lit/sec. Take f 0 01 and coefficient of contraction 0 62.

16. *(a)* A horizontal pipe of diameter 500 mm is suddenly contracted to a diameter of 250 mm. If the discharge through the pipe is 270 lit/sec, find the practical loss of head due to sudden contraction of pipe.

(b) A rectangular channel 4 m wide and 2 m deep is laid at a slope of 1 in 2000. Find the discharge using Kutter's formula taking N 0 025.

17. A trapezoidal channel has side slopes 2V : 3H. It is discharging water at the rate of 25 cumecs with a bed slope 1 in 2000. Design the channel for its best form. Use Manning's formula taking n 0 01.

18. Compare centrifugal pump with reciprocating pump on different aspects.

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