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BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL—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. Define viscosity and kinematic viscosity. 1½+1½

2. A tank contains mercury to a depth of 3 m and above the mercury water present to a certain depth. If pressure intensity at the bottom of the tank is 350 kN/m^2 , what is the water depth in the tank?

3. Write any two differences between steady flow and unsteady flow.

4. Deduce the relationship between the hydraulic coefficients.

5. List any three advantages of triangular notch over rectangular notch. 1×3

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6. Define weir and classify according to the shape of the crest. *
7. State an expression for the loss of head due to (a) sudden enlargement and (b) sudden contraction of a pipe. $1\frac{1}{2}+1\frac{1}{2}$
8. Write any three differences between pipe flow and open channel flow. 1×3
9. What is a turbine? List out the classification of turbine according to the direction of flow of water through runner. $1+2$
10. Draw a neat sketch of hydroelectric power plant.

PART—B

$10\times 5=50$

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 plane surface is 3 m wide and 5 m deep. It lies in vertical plane in water. Determine the total pressure and position of centre of pressure on the plane surface when its upper edge is horizontal and (a) coincides with water surface, (b) 4 m below the free water surface. *
12. Explain the construction and working of a venturi meter with a neat sketch.
13. A sharp edged orifice of 20 mm diameter is discharging water under a constant head of 40 m. The jet drops 1 m in a horizontal distance of 39 m. The measured rate of discharge is 1.725 l/sec. Find the three hydraulic coefficients.

14. Water flows over a rectangular weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right-angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively, find the depth over the triangular weir.
15. Two reservoirs are connected by a pipeline of 22 m long consisting of two pipes, one of 15 cm diameter and length 6 m, and other of diameter 22.5 cm and 16 m long. If the difference of water levels in the two reservoirs is 6 m, calculate the discharge considering all losses. Take, $f = 0.04$ and $h_f = fLV^2 / 2gd$.
16. A main pipe is divided into two parallel pipes of 0.8 m and 0.5 m diameter with equal lengths. Parallel pipes meet again at the lower end. Find the discharge in each parallel pipe, if the discharge in the main pipe is $2.5 \text{ m}^3 / \text{sec}$. The coefficient of friction for each parallel pipe is same.
17. 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 m^2 . Find the dimensions of the section if it is most economical. Also determine the discharge of the most economical section if $C = 50$.
18. Explain the parts of a Francis turbine with the help of a neat sketch.
