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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2017

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) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. The specific gravity of a liquid is 2.5. What are its specific weight, specific mass and specific volume? 1+1+1=3
2. State the relation among atmospheric pressure, gauge pressure and absolute pressure. 1+1+1=3
3. Give the difference between laminar and turbulent flows, giving example in each case. 1½+1½=3
4. Define vena-contracta and coefficient of resistance. 1½+1½=3
5. What is notch? Classify the notches based on the shape of opening. 3
6. Write an expression for the discharge through a triangular notch. 3

7. Explain with the help of neat sketch (a) hydraulic gradient line and (b) total energy line. $1\frac{1}{2}+1\frac{1}{2}=3$
8. State the difference between flow through pipes and flow through channels. $1\frac{1}{2}+1\frac{1}{2}=3$
9. Explain the working of double-acting reciprocating pump with a neat sketch. 3
10. What is a surge tank and what are its main functions? 3

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 tank contains water to a depth of 3 m and oil of specific gravity 0.8 to a depth of 5 m. What is the intensity of pressure at the bottom of the tank and side? Plan dimensions of the tank are 3 m × 3 m. 10
12. A 20 cm × 10 cm venturimeter is mounted in a vertical pipe carrying water the flow being upwards. The throat section is 30 cm above the entrance section of venturi meter. For a certain flow through the meter, the differential gauge between the throat and entrance indicates a gauge deflection of 30 cm. Assuming the coefficient of meter is 0.95, find the discharge. 10
13. Water flows through a sharp edged circular orifice 7.5 mm diameter in the side of a tank. The head of the water above the centre of the orifice is 1.22 m. The jet passes through a ring whose centre is 1.22 m horizontally and 330 mm vertically from the centre of the vena-contracta. The time required to discharge 66 lit of water was 500 sec, find the hydraulic coefficient C_c , C_v and C_d . 10

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 its coefficient of discharge is 0.62 if the coefficient of triangular notch is 0.59 m. What will be the head through the triangular notch when the head over rectangular notch is 0.15 m? 10
15. (a) Find the discharge flowing through a pipe 900 m long, diameter 30 cm if the pressure head available is 12 m, $f = 0.024$. 6
- (b) Water is flowing through a pipe 200 km long and 1.1 m diameter with a velocity of 1 m/sec. Find the head loss due to friction using Chezy's formula take $C = 64$. 4
16. Two reservoirs are connected by a pipe line 22 m long consisting of two pipes one of 15 cm dia and length 6 m and the other of dia 22.5 cm and 16 cm length. If the difference of water levels in two reservoirs is 6 m, calculate the discharge considering the losses. Take $f = 0.04$ and $h_f = 4 flv^2 / 2gd$. 10
17. A trapezoidal channel has side slope 2 vertical to 3 horizontal. It is discharging water at the rate of 20 cumecs with a bed slope 1 in 2000. Design the channel for its best form. Use Manning's formula. Taking $N = 0.01$. 10
18. Explain Francis turbine with a neat sketch. 10
