1055

Code : 15CE41T

Register Number | | | | | | | |

IV Semester Diploma Examination, Nov./Dec. 2017

HYDRAULICS

Time : 3 Hours] **[Max. Marks : 100**

Note : **All** parts are compulsory.

PART – A

(Answer any **six** questions. Each carries **five** marks)

1. Write S.I. unit of the following : **1 × 5 = 5**
   (a) Pressure
   (b) Density
   (c) Discharge
   (d) Pressure head
   (e) Hydraulic mean depth

2. $P_{absolute} = P_{atmospheric} + P_{gauge}$
   Explain the equation with neat diagram. **5**

3. Write Bernoulli's equation. Explain briefly. **5**

4. Draw neat sketch of venturimeter and explain terms used in discharge equation. **5**

5. Define : **1 × 5 = 5**
   (a) C_v (b) C_c
   (c) C_d (d) Q_{th}
   (e) Q_{act}

[Turn over

6. What are mouth pieces ? Mention types of mouth piece. **1 + 4 = 5**

7. Explain with sketch : **2½ + 2½ = 5**
   (a) Cippoletti Weir
   (b) End contraction

8. Explain : **2½ + 2½ = 5**
   (a) Most economical rectangular section
   (b) Hydraulic mean depth

9. List different major and minor losses in pipe flow. **5**

PART – B

(Answer any **seven** questions. Each carries **ten** marks)

10. (a) With sketch total pressure $P = WA\bar{X}$. Explain briefly. 3
    (b) Determine the total pressure and depth of center of pressure on an Isosceles triangular plate of base 5 m and altitude 5 m. When it is immersed vertically in oil with specific gravity of 0.8 the base of triangle 2 m below the free surface of water. 7

11. (a) What is manometer ? Mention types of monometers. 3
    (b) A simple monometer is used to measure the pressure of oil sp. gr. 0.8 flowing in a pipe line. It's right limb is open to the atmosphere and left limb is connected to the pipe. The centre of pipe 100 mm below the level of mercury of sp. gr. 13.6 in the right limb. If the difference of mercury level in two limbs is 160 mm. Determine absolute pressure in pipe. 7

12. (a) Mention the types of flow. 3
    (b) A pipe 300 m long has a slope 1 in 100 and tapers from 1 m diameter at the higher end to 0.5 m at the lower end. Quantity of water flowing is 5400 litre per minute. If pressure at the higher end is 70 kN/m^2, find the pressure at the lower end. 7

13. (a) Define : 3

(i) Total head

(ii) Total energy

(iii) Specific energy

(b) An oil of specific gravity 0.75 is flowing through a venturimeter having inlet diameter 200 mm and throat diameter 100 mm. The oil mercury differential monometer shows a reading of 300 mm. Find discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$. 7

14. (a) Mention different types of orifices. 3

(b) A jet of water issues from a sharp edged orifice under a constant head of 0.51 m. at a certain point of issuing jet. The horizontal and vertical co-ordinates measured from vena-contracta are 0.406 m and 0.85 m respectively.

Determine C_v and C_c take $C_d = 0.62$ 7

15. (a) Mention any four advantages of a triangular notch over rectangular notch. 3

(b) A rectangular notch has a discharge 300 lit/sec when the head of water over the notch is half of the length of notch. Find the length of notch, take $C_d = 0.623$. 7

16. (a) $Q = C_d L h\sqrt{2g(H - h)}$

(i) What equation is this ?

(ii) Write notation of above equation. 3

(b) The daily record of rainfall over a catchment area is 0.2 million cubic meter. It has been found that 80% of the rain water reaches the storage reservoir and then pass over a rectangular weir. What should be the length of weir if head over weir not more than 400 mm, take $C_d = 0.6$. 7

17. (a) $V = C\sqrt{mi}$, explain this equation. 3

(b) Design a most economical rectangular section for a discharge 0.3 m^3/sec and bed slope as 1 in 1000 and take C = 50. 7

18. (a) $h_f = \frac{4flv^2}{2gd}$

(i) Name the components of the equation.

(ii) What equation is this ?

(iii) What kind of energy loss occur ? 3

(b) Population of a town is 2 lakhs. Rate of water supply is 200 litres/head/day. Head available at end of town 40 m, distance of reservoir from town is 80 km. $f = 0.01$

Determine :

(i) Discharge through pipe.

(ii) Diameter of pipe.

(iii) Velocity of the flow. 7

19. (a) List out any three advantages of centrifugal pump over reciprocation pump. 3

(b) Explain with sketch the principle working of a Francis turbine. 7