SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : FM(15A01305) **Course & Branch**: B.Tech - CE

Year & Sem: II-B.Tech & I-Sem **Regulation:** R15

UNIT – IV

Flow through Orifice and Mouthpieces and Flow through Notchs and Weirs

1. Explain the principle of orifice meter and derive the equation to find the rate of flow of water through a pipe using the same. 10M

2 a) A rectangular orifice 0.9 m wide and 1.2 m deep is discharging water from a vessel. The top edge of the orifice is 0.6m below the water surface in the vessel. Calculate the discharge through the orifice if C_d = 0.6 and percentage error if the orifice is treated as a small orifice. 5M

b) A rectangular orifice of 2 m width and 1.2 m deep is fitted in one side of a large tank. The water level on one side of the orifice is 3 m above the top edge of the orifice, while on the other side of the orifice, the water level is 0.5 m below its top edge. Calculate the discharge through the orifice if C_d = 0.64 5M

3. An external cylindrical mouth piece of diameter 150 mm is discharging water under a constant head of 6 m. Determine the discharge and absolute pressure head of water at vena – contracta. Take C_d = 0.855 and C_c for vena contracta = 0.62 and atmospheric pressure head = 10.3 of water. 10M

4. a) The head of water over a rectangular notch is 900mm. The discharge is 300lit/s. Find the length of the notch, when C_d = 0.62 5M

b) Water flows through a triangular right – angled weir first and then over a rectangular weir of 1m width. The discharge co-efficient of 0.7 respectively. If the depth of water over the triangular weir is 360 mm. Find the depth of water over the rectangular weir. 5M

5. a) Find the discharge through a trapezoidal notch which is 1m wide at the top and 0.40 m at the bottom and is 30 cm in height. The head of water on the notch is 20 cm. Assume C_d for rectangular portion as = 0.62 while for triangular portion = 0.60 5M

b) Derive an expression for the discharge of fluid over a stepped notch 5M

6. A cipolletti weir of crest length 60 cm discharges water. The head of water over the weir is 360 mm. Find the discharge over the weir if the channel is 80 cm wide and 50 cm deep.

Take C_d = 0.6 10M

7. a) A broad crested weir of 50 m length, has 50 cm height of water above its crest. Find the maximum discharge. Take C_d = 0.60. Neglect velocity of approach. 5M

   b) If the velocity of approach is to be taken into consideration, find the maximum discharge when the channel has a cross – sectional area of 50 m^2 on the upstream side. 5M

8. Find an expression for the time required to empty a tank of area of cross-sectionA, with a rectangular notch. 10M

9. A sharp crested rectangular weir of 1 m height extends acrossa rectangular channel of 3 m width. If the head of water oer the weir is 0.45 m, calculate the discharge. Cosider velocity of approach and assume C_d = 0.623 10M

10. a) Define orifice and mouth pieces. 2M

    b) Differentiate between notch and weir. 2M

    c) Define coefficient of velocity and coefficient of contraction. 2M

    d) Define vena-contracta. 2M

    e) Derive the expression $C_d = C_C \times C_c$ 2M

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UNIT – IV

Flow through Orifice and Mouthpieces and Flow through Notchs and Weirs

1. The ratio of area of jet at vena-contracta to the area of orifice is [ ]
   A) Coefficient of discharge B) Coefficient of velocity
   C) Coefficient of contraction D) None of the above
2. The ratio of actual discharge to theoritical discharge is [ ]
   A) Coefficient of discharge B) Coefficient of velocity
   C) Coefficient of contraction D) None of the above
3. The ratio of actual velocity to theoritical velocity is [ ]
   A) Coefficient of discharge B) Coefficient of velocity
   C) Coefficient of contraction D) None of the above
4. Orifice as well as mouth pieces are used for measuring [ ]
   A) Rate of flow B) Velocity of flow C) Coefficient of velocity D) Coefficient of discharge
5. For pipe flow, at constant capacity, head is proportional to [ ]
   A) $1/d$ B) $1/d^2$ C) $1/d^4$ D) $1/d^5$
6. The upper surface of the weir over which water flows is known as [ ]
   A) Pappe B) Crest C) Sill D) Vein
7. Fire hose nozzle is generally made of [ ]
   A) Divergent shape B) Convergent shape C) Cylindrical shape D) Parabolic shape
8. The rise of liquid along the walls of a revolving cylinder as compared to depression at the centre With respect to initial level is [ ]
   A) Same B) More C) Less D) Unpredictable
9. Mouth pieces are used to measure [ ]
   A) Velocity B) Pressure C) Rate of flow D) Viscosity
10. In submerged orifice flow, the discharge is proportional to which one of following parameters [ ]
    A) Square root of the downstream head

B) Square root of the upstream head

C) Square of the upstream head

D) Square root of the difference between upstream and downstream heads

11. If the velocity of flow does not change with respect to length of direction of flow, it is called [ ]

A) Steady flow B) Uniform flow C) Incompressible flow D) Rotational flow

12. The density of flow is constant from point to point in a flow region, it is called [ ]

A) Steady flow B) Incompressible flow C) Uniform flow D) Irrotational flow

13. The rate of flow through a venturimeter varies [ ]

A) H B) $\sqrt{H}$ C) $H^{3/2}$ D) $H^{5/2}$

14. The rate of flow through V-notch varies as [ ]

A) H B) $\sqrt{H}$ C) $H^{3/2}$ D) $H^{5/2}$

15. Notch is a device used for measuring [ ]

A) Rate of flow through pipe B) Rate of flow through small channel

C) Velocity through a pipe D) Velocity through a small channel

16. The discharge through rectangular notch is [ ]

A) $Q=2/3 \times C_d \times L \times H^{5/2}$ B) $Q=2/3 \times C_d \times L \times H^{3/2}$

C) $Q=8/15 \times C_d \times L \times H^{5/2}$ D) $Q=2/3 \times C_d \times L \times H^{3/2}$

17. The discharge through triangular notch is [ ]

A) $Q=2/3 \times C_d \times \tan\theta/2 \times H^{5/2}$ B) $Q=2/3 \times C_d \times \tan\theta/2 \times H^{53/2}$

C) $Q=2/15 \times C_d \times \tan\theta/2 \times \sqrt{2g} H^{5/2}$ D) $Q=2/3 \times C_d \times L \times H^{3/2}$

18. The velocity with which the water approaches a notch is called [ ]

A) Velocity of flow B) Velocity of approach C) Velocity of whirl D)None of the above

19. Francis's formula for a rectangular weir for two end contraction suppressed is given by[ ]

A) $Q=1.84.L.H^{5/2}$ B) $Q=2/3.L.H^{3/2}$ C) $Q=1.84.L.H^{3/2}$ D) $Q=2/3.L.H^{5/2}$

20. A triangular notch is more accurate measuring device than therectangular notch for measuring Which one of the following [ ]

A) Low flow rates B) Medium flow rate C) High flow rates D) All flow rates

21. A standard 90° V-notch weir is used to measure discharge. The discharge is Q1 for heights H1 above the sill and Q2 is the discharge for a height H2– If H2 / H2 is 4, then Q2 / Q2 is[ ]

A) 32 B) $16\sqrt{2}$ C) 16 D) 18

22. A short tube mouthpiece will not run full at its outlet if the head under which the orifice works, is [ ]

A) Equal of 12.2 m of water B) More than 12.2 m of water

C) Less than 12.2 m of water D) None of the above

23. The thickness of a sharp crested weir is kept less than [ ]

A) Two-third of the height of water on the sill B) One-fourth of the height of water on the sill

C) One-third of the height of water on the sill D) One half of the height of water on the sill

24. The side slope of Cipolletti weir is generally kept [ ]

A) 1 to 3 B) 1 to 4 C) 1 to 5 D) 1 to 2

25. The theoritical discharge through orifice is [ ]

A) Area of orifice x $\sqrt{2gh}$ B) Area of orifice x $\sqrt{2h}$

C) Area of orifice x $\sqrt{gh}$ D) Area of orifice x $\sqrt{2gh}$

26. For external mouth pieces, absolute pressure head at ena-contracta is [ ]

A) $H_c=H_a$- H B) $H_c=H_a$-0.49 H C) $H_c=H_a$-0.89 D) $H_c=H_a$-0.89 H

27. The discharge through fully submerged orifice is [ ]

A) Q = C_d x b x (H_2-H_1) x $\sqrt{gh}$ B) Q = C_d x (H_2-H_1) x $\sqrt{2gh}$

C) Q = C_d x b x (H_2-H_1) x $\sqrt{2gh}$ D) Q = b x (H_2-H_1) x $\sqrt{2gh}$

28. The condition height for maximum discharge over a broad-crested weir is [ ]

A) h=2/3.H B) h=1/3.H C) h=4/3.H D) h=2.H

29. The error in discharge due to the error in the measurement of head over a rectangular notch is [ ]

A) 1/2 dH/H B) 3/2 dH/H C) 3/2 dH D) 3/4 dH/H

30. The condition for maximum discharge over a broad-crested weir is [ ]

A) $Q_{max.}$= 1.705 C_d $H^{3/2}$ B) $Q_{max.}$= 1.905 C_d L $H^{3/2}$

C) $Q_{max.}$= 1.705 L $H^{3/2}$ D) $Q_{max.}$= 1.705 C_d L $H^{3/2}$

31. The fluid property, due to which, mercury does not wet the glass is [ ]

A) Surface tension B) Cohesion C) Adhesion D) Viscosity

32. The dimensions for dischage is [ ]

A) L^3 B) L^3T^{-2} C) L^3T^{-1} D) ML^2T^{-1}

33. In a forced vortex, the velocity of fluid anywhere within fluid is [ ]

A) Maximum B) Minimum C) Zero D) Unpredictable

34. Hydrometer is used to measure [ ]

A) Specific gravity of liquids B) Specific gravity of solids

C) Specific gravity of gasses D) None of the above

35. The head due to velocity approach is given by [ ]

A) $h_a=V_a/2g$ B) $h_a=V_a^2/2g$ C) $h_a=V_a/2g$ D) $h_a=V_a^2/g$

36. The coefficient of discharge for external mouth piece is [ ]

A) 0.375 B) 0.5 C) 0.707 D) 0.855

37. The velocity corresponding to Reynold number of 2800, is called [ ]

A) sub-sonic velocity B) super-sonic velocity

C) lower critical velocity D) higher critical velocity

38. The atmospheric pressure at sea level is [ ]

A) 103 kN/m^2 B) 10.3 m of water C) 760 mm of mercury D) all of these

39. The error in discharge (dQ/Q) to the error in measurement of head (dH/H) over a rectangular notch is given by [ ]

A) $\frac{dQ}{Q} = \frac{1}{2} \times \frac{dH}{H}$ B) $\frac{dQ}{Q} = \frac{3}{4} \times \frac{dH}{H}$ C) $\frac{dQ}{Q} = \frac{dH}{H}$ D) $\frac{dQ}{Q} = \frac{3}{2} \times \frac{dH}{H}$

40. The discharge over a triangular notch is [ ]

A) inversely proportional to $H^{3/2}$ B) directly proportional to $H^{3/2}$

C) inversely proportional to $H^{5/2}$ D) directly proportional to $H^{5/2}$

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