864

Register No.: [ ]

April 2024

Time – Three hours
(Maximum Marks: 100)

[N.B. 1. Answer all questions under Part-A. Each question carries 3 marks.

2. Answer all the questions either (A) or (B) in Part-B. Each question carries 14 marks.]

PART – A

1. Define density.
2. Write short notes on sluice gate.
3. State Bernoulli's theorem.
4. Write about the three hydraulic coefficients.
5. Compare 'V' Notch and Rectangular Notch.
6. Find the discharge over a rectangular weir 3 m long under a head of 0.40 m by using Bazin's formula.
7. Define Hydraulic mean depth.
8. Find the critical depth of the water flowing through rectangular channel of width 6m when the discharge is $20 m^3/s$.
9. Differentiate between a pump and a turbine.
10. Write short notes on suction head.

PART – B

11. (a) (i) A capillary tube of diameter 2.5×10^{-3} m is dipped in water. The surface tension at the contact surface is 73.5×10^{-3} N/m. If the angle of contact is 25°, determine the capillary rise.(7)

(ii) The pressure at a point in a liquid is given as 49×10^3 N/m^2. Find the corresponding height of liquid when it is (1) water (2) an oil of specific gravity 0.8. (7)

(Or)

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(b) A simple U-tube manometer was used to find the pressure at a point A of kerosene of relative density 0.8 flowing through a pipe. The difference of mercury in the U-tube between the limbs was 0.10m and the free surface of mercury in the open limb was 0.05 m above A. Find the pressure at A.

12. (a) The diameter of a pipe changes from 500mm to 200 mm gradually. The larger end is 9m above the datum and the smaller end is 3m above the datum. The pressure and velocity at the larger section are $539.5 \times 10^3 N/m^2$ and 1.5m/s respectively. Assuming no loss between the sections, compute (1) velocity at smaller end (2) pressure at smaller end.

(Or)

(b) Water is collected in a tank, 3m × 3m to a depth of 1.9m in 2 hours by means of a circular orifice of 25 mm diameter under a constant head of 3m. The area of the jet measured at vena contracta is $0.00032m^2$. Find (i) coefficient of discharge (ii) coefficient of contraction (iii) coefficient of velocity.

13. (a) A trapezoidal notch is 1.2m wide at the top and 0.50m at the bottom. The height is 0.4m. Determine the discharge through the notch when the head of water is 0.3m. Take C_d as 0.60.

(Or)

(b) A rectangular notch of 1.5m wide is discharging under a constant head of 220mm. Find the discharge in lps, if the coefficient of discharge is 0.60.

14. (a) An economical rectangular channel discharges 15 cumec with a velocity of 1.60m/s. Take Chezy's constant as 60, find (i) Depth of flow (ii) Bed width (iii) Bed fall.

(Or)

(b) An economical trapezoidal channel has a bed width of 4m and side slopes of 1:1. It has a bed fall of 1 in 1600. Take C as 60. Determine the discharge.

15. (a) Explain with neat sketch, the construction and working of a centrifugal pump.

(Or)

(b) A single acting reciprocating pump has piston area $0.25m^2$ and it has 0.45m stroke length and it discharges $0.079m^3$ of water per second at 45 rpm through a total head of 14m. Find (i) Percentage slip (ii) Theoretical discharge (iii) Efficiency of pump.
