Register No.: [ ]

753

April 2023

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. How the intensity of pressure is converted into pressure head?

2. Write short notes on sluice gate.

3. How are orifices classified?

4. State Bernoulli's theorem. What are the practical applications of Bernoulli's theorem?

5. How are weirs classified?

6. What is meant by Crest of sill and Nappe?

7. Write short notes on open channels.

8. Write short notes on soil cement lining of canals.

9. What are the precautions to be taken while operating a centrifugal pump?

10. Write a short note on air vessels.

PART – B

11. (a) Calculate the capillary rise and fall in a glass tube of 2.5mm diameter when immersed vertically in (i) Water and (ii) Mercury. Take surface tensions σ = 0.0725 N/m for water and σ = 0.52 N/m for mercury in contact with air. The specific gravity for mercury is given as 13.6 and angle of contact = 130°.

(Or)

(b) A circular plate of 2 m diameter is immersed vertically in water such that the centre is at a depth of 2 m below the free water surface. Find, (i) total pressure on the plate and (ii) depth of centre of pressure.

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12. (a) The section of a tapering pipe varies from 200 mm to 50mm. The larger end is at a height of 5 m above the datum. The smaller end is 3 m above the datum. The pressure of water at the larger section is 490.5×10^3 Pa and the velocity of flow at the larger section is 1m/s. Determine, (a) velocity at the smaller section and (b) pressure at the smaller section.

(Or)

(b) A pipe line connects two reservoirs whose difference in water levels is 15 m. The length of the pipe is 600 m. Taking, f as 0.02, and discharge as 300 lps, find the diameter of the pipe line.

13. (a) A trapezoidal notch, 600mm wide at the bottom has side slopes 1:1. If the discharge over the notch is 300 lps, determine the head causing flow over the sill of the notch. Take C_d as 0.62.

(Or)

(b) A rectangular weir, 6 m long is divided into 3 bays by two vertical posts, each 0.3 m wide. Determine the discharge if the head of water over the weir is 0.45 m. Take C_d as 0.8.

14. (a) A trapezoidal channel is cut with a bottom width of 6m and side slopes of 1:1. The allowable velocity is 0.75 m/s. What bed slope will produce a discharge of 5.5 m^3/s? Take, N = 0.03.

(Or)

(b) Design an economical rectangular channel to carry 90 m^3/s with a bed fall of 1 in 1500. In the Chezy's formula, C=50.

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

(Or)

(b) (i) What are the different types of heads for a centrifugal pump? (6)

(ii) A centrifugal pump, installed in a well for irrigation, pumps 2400 litres of water per minute to a height of 25 m through 120 m long and 150 mm diameter pipe. The overall efficiency of the pump is 60%. Taking friction factor as 0.04, calculate the power required to drive the pump. (8)
