Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2024

(2020 SCHEME)

Course Code : 20CET394

Course Name: Earth Dams and Earth Retaining Structures

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain seepage failures in dams.
2. Describe design of filters in earth dams.
3. Explain any one method of measurement of pore water pressure in dams.
4. Why it is necessary to determine the position of phreatic line?
5. Enlist the assumptions of Rankine's theory of earth pressure.
6. Explain the importance of capillarity tension in earth pressure.
7. Describe the methods of construction of flexible retaining structures.
8. Describe different types of earth retaining structures.
9. Illustrate different types of diaphragm walls.
10. List the uses of sheet pile walls.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Summarize foundation and embankment seepage control measures in earth dams with suitable figures. (10)
    b) List the advantages and disadvantages of earth dams. (4)

OR

12. a) Explain the factors affecting the selection of type of dam. (8)
    b) Explain upstream and downstream slope protection measures with suitable figures. (6)

MODULE II

13. a) Illustrate Swedish Slip Circle method of stability analysis. (8)
    b) Explain critical stability conditions of an earth dam. (6)

OR

14. a) Explain the graphical method to determine the phreatic line in an earth dam with filters by drawing a neat sketch. (10)
    b) Describe methods of construction of earth dams. (4)

MODULE III

15. a) A retaining wall with vertical back 8 m high, supports a sand soil with $c' = 0$ and $\varphi' = 34^0$. Neglecting wall friction, calculate the total active thrust on the wall, if; (10)
        i) the water table is below the base of the wall ($\gamma = 16$ kN/m^3).
        ii) the water table rises up to a height of 4 m above the base of the wall ($\gamma_{sat} = 20.5$ kN/m^3).
        iii) the water table rises up to the ground surface.
    b) Illustrate critical depth for an unsupported cut in cohesive soil. (4)

OR

16. a) A vertical wall of height 4 m retains a cohesionless backfill with a horizontal surface. The unit weight of soil is 20 kN/m^3. The angle of internal friction of soil is 30^0. Find the variation in active earth pressure on the wall according to Coulomb's earth pressure theory, if the angle of wall friction varies from 0^0 to 30^0. (9)
    b) Describe the assumptions of Coulomb's earth pressure theory. (5)

MODULE IV

17. a) Discuss the graphical methods of earth pressure computation by Rehbann's method. (9)
    b) Describe the concept of trial wedge method of earth pressure computation. (5)

OR

18. a) Explain the procedure for friction circle method. (7)
    b) A retaining wall, 3 m high supports a dry cohesionless backfill with a plane ground surface sloping upwards at a surcharge angle of 10^0 from the top of the wall. The back of wall is inclined to the vertical at a positive batter angle of 8^0. The backfill weighs 19 kN/m^3 and has an angle of shearing resistance of 30^0. Assuming an angle of wall friction of 10^0, determine the total active pressure and the pressure distribution by Rebhann's method. (7)

MODULE V

19. a) List different types of coffer dams. Explain the step-by-step procedure for the design of coffer dam. (10)
    b) Describe different types of sheet pile walls. (4)

OR

20. a) Describe the stability checking of anchored sheet pile wall using free earth method in cohesionless soil. (8)

b) Describe Rowe's moment reduction method. (6)

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