B.Tech. DEGREE EXAMINATION, MAY 2022
Sixth Semester

18CEE301T – FOUNDATION ENGINEERING AND DESIGN
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

Note:
(i)   **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii)   **Part - B** should be answered in answer booklet.

Time: 2½ Hours   Max. Marks: 75

PART – A (25 × 1 = 25 Marks)   Marks   BL   CO   PO
Answer **ALL** Questions

1. The ratio between the length of the sample recovered to the depth of penetration of the sampling tube is   1   1   1   1
   (A) Area ratio   (B) Recovery ratio
   (C) Inside clearance   (D) Outside clearance

2. The field procedure to study the variation in the soil profile of horizontal direction is   1   1   1   1
   (A) Electrical profiling   (B) Electrical sounding
   (C) Critical distance   (D) Mean resistivity

3. The standard penetration test is performed in a hole of diameter about   1   1   1   1
   (A) 25 mm to 35 mm   (B) 25 mm to 50 mm
   (C) 55 mm to 150 mm   (D) 10 mm to 25 mm

4. The outside clearance of the soil samples to get undisturbed sample is   1   1   1   1
   (A) Between 1 to 3   (B) Less than 1
   (C) Greater than 3   (D) Less than inside clearance

5. The depth of soil exploration for a square footing should be   1   1   1   1
   (A) Width of footing   (B) 1.5 times of footing width
   (C) 2 times of footing width   (D) 3 times of footing width

6. The Terzaghi's bearing capacity factors are functions of   1   1   2   1
   (A) Angle of internal friction of soil   (B) Cohesion
   (C) Friction angle between load and centre of footing   (D) Safe bearing pressure

7. The size of bearing plate for a plate load test will be   1   1   2   1
   (A) Less than 0.2 m   (B) Between 0.3 m to 0.75 m
   (C) Less than 0.3 m   (D) Greater than 1.0 m

8. The width of the test pit in the plate load test is   1   1   2   1
   (A) 2.5 times width of plate   (B) 3 times width of plate
   (C) 4 times width of plate   (D) 5 times width of plate

The allowable soil pressure for
     $DL + LL = 250 \ kN/m^2$
     $DL + reduced \ LL = 150 \ kN/m^2$

(OR)

b. Explain the causes and remedial measures of total settlement.   10   2   3   1

29. a. A group of 9 piles each 10 m long of 300 mm × 300 mm reinforced concrete square pile. The spacing between the piles are 0.8 m. The subsoil consists of clay having $C = 110 \ kN/m^2$ and FOS = 3. Determine the safe frictional load of the pile. Take adhesion factor is 0.6.   10   4   4   2

(OR)

b. Explain the field method to determine the load carrying capacity of pile by pile load test with neat sketch.   10   3   4   1

30. a. A gravity retaining wall of height 9 m retains backfill having $\gamma = 18 \ kN/m^3$ and $\phi = 30°$. Assume the vertical smooth wall. Determine the magnitude of the active earth pressure and point of application of force when the water table is 4 m below the ground water table. Take $\gamma' = 10 \ kN/m^3$.   10   5   5   2

(OR)

b. Draw the Culmann's graphical method of active earth pressure and describe the detail procedure to calculate the active lateral earth pressure.   10   4   5   1

* * * * *

9. When $\phi = 0$, the Terzaghi's bearing capacity factor due to cohesion N_C is   1   2   2   1
    (A) 5.14   (B) 5.7
    (C) 7.5   (D) 9

10. The net ultimate bearing capacity of square footing in sand is given by   1   2   2   1
    (A) $0.3\gamma BN_\gamma + \gamma D_f (Nq - 1)$ (B) $0.3\gamma BN_\gamma + \gamma D_f (Nq + 1)$
    (C) $0.4\gamma BN_\gamma + \gamma D_f (Nq - 1)$ (D) $0.4\gamma BN_\gamma + \gamma D_f (Nq + 1)$

11. The uniform vertical downward movement of foundation base is called as   1   1   3   1
    (A) Compaction   (B) Uniform settlement
    (C) Differential settlement   (D) Tilt

12. The secondary consolidation in a clayey soil will occur because of   1   2   3   1
    (A) Sudden application of load   (B) Dissipation of pure water
    (C) Dissipation of pore air   (D) Rearrangement of soil particles

13. Two or more footings connected by a beam is called as   1   1   3   1
    (A) Strip footing   (B) Strap footing
    (C) Spread footing   (D) Raft footing

14. The raft foundations are generally preferred under the conditions when the area required for individual footing should be more than   1   2   3   1
    (A) 20 % of total area   (B) 30 % of total area
    (C) 40 % of total area   (D) 50 % of total area

15. If the failure of a finite slope occur through the toe is known as   1   1   3   1
    (A) Base failure   (B) Face failure
    (C) Toe failure   (D) Slope failure

16. The downward drag which occurs when a soil layer surrounding a portion of the pile shaft settles more than the pile is known as   1   1   4   1
    (A) Positive skin friction   (B) Negative skin friction
    (C) End bearing   (D) Skin friction

17. The pile transfer the load through its bottom is called as   1   1   4   1
    (A) End bearing pile   (B) Friction pile
    (C) Compaction pile   (D) Displacement pile

18. Classification of pile based on the method of load transfer   1   1   4   1
    (A) Driven pile   (B) Load bearing pile
    (C) End bearing pile   (D) Compaction pile

19. The area used to calculate the skin friction of pile is   1   2   4   1
    (A) Cross-sectional area   (B) Base area
    (C) Circumferential area   (D) Triangular area

20. The initial test on the pile in the pile load test is conducted on   1   1   4   1
    (A) Test pile   (B) Working pile
    (C) Steel pile   (D) Concrete pile

21. If the angle of internal friction of soil is 30°, the value of coefficient of active earth pressure is   1   2   5   1
    (A) 3   (B) 1.5
    (C) 0.5   (D) 0.33

22. The value of coefficient of earth pressure on retaining will is maximum at   1   2   5   1
    (A) Active state   (B) Passive state
    (C) At rest state   (D) Saturated state

23. The coefficient of active earth pressure 'k_a' is given by   1   2   5   1
    (A) $k_a = \dfrac{1 + \sin\phi}{1 - \sin\phi}$ (B) $k_a = \dfrac{1 - \sin\phi}{1 + \sin\phi}$
    (C) $k_a = \dfrac{1 + \tan\phi}{1 - \sin\phi}$ (D) $k_a = \dfrac{1 + \tan\phi}{1 - \tan\phi}$

24. The material which is retaining by the retaining structure is generally called as   1   1   5   1
    (A) Surcharge   (B) Backfill
    (C) Soil slope   (D) Angle of repose

25. The critical height of the cohesive soil, the depth of vertical cut upto which no lateral support is required is given as   1   2   5   1
    (A) $\dfrac{2c}{\gamma}$ (B) $\dfrac{2\gamma}{c}$
    (C) $\dfrac{4c}{\gamma}$ (D) $\dfrac{4\gamma}{c}$

PART – B (5 × 10 = 50 Marks)
Answer ALL Questions

                                                            Marks   BL   CO   PO

26. a. Briefly explain the wash boring methods of soil exploration with neat sketch.   10   2   1   1

(OR)

    b. Describe in detail about the seismic refraction method of geophysical soil exploration with neat sketch.   10   3   1   1

27. a. A column carrying a load of 700 kN has to be supported by a square footing with its base at 1.5 m depth. What is the required size of the footing? Where FOS = 2.5, C = 8 kN/m², $\phi = 35°$, $N_c = 57.8$, $N_q = 41.4$, $N_\gamma = 42.4$, $\gamma = 18$ kN/m³, and $\gamma' = 11$ kN/m³. Use Terzaghi's method.   10   4   2   2

(OR)

    b. Explain the detail procedure to conduct the plate load test with neat sketch.   10   2   2   1

28. a. Proportion the rectangular combined footing for the following data. The dead load and live load of the left column are 400 kN and 500 kN respectively, and for the right column is 600 kN and 850 kN respectively. If the projection beyond the column cannot exceed 0.5 m on the both sides.   10   4   3   3