Allowable bearing pressure:

For DL + reduced LL = 150 kN/m^2

For DL + LL = 220 kN/m^2

Load (kN)	Column A	Column B
DL	500	630
LL	340	700

(OR)

b. Explain in detail about the causes and remedial measures of total settlement foundation / structure.   12 2 3 2

31. a. Explain about the field method to determine the load carrying capacity of pile with neat sketch.   12 2 4 2

(OR)

b. Determine the allowable load of a bored pile 500 mm diameter having the length of is 8 m, γ = 16 kN/m^3, ϕ = 35°, C = 25 kN/m^2. Take N_c = 65, N_γ = 18, N_q = 35°, adhesion factor = 0.6, FOS = 3. Assume lateral earth pressure coefficient is 0.6.   12 4 4 2

32. a. Explain the Culmann's graphical method to calculate the lateral earth pressure on the retaining wall.   12 2 5 1

(OR)

b. A retaining wall of 9 m high retains the cohesionless soil. For top 5 m, the backfill has the density of soil = 18.5 kN/m^3 and ϕ = 28°. The water table is at the depth of 5 m below GL has the unit weight of 24 kN/m^3 (γ_{sat}) and ϕ = 33°. Determine the active earth pressure magnitude and its point of application.   12 4 5 2

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Reg. No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.Tech. DEGREE EXAMINATION, MAY 2023
Sixth Semester

18CEE301T – FOUNDATION ENGINEERING AND DESIGN
(For the candidates admitted during the academic year 2018-2019 to 2021-2022)

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 & Part - C** should be answered in answer booklet.

Time: 3 hours   Max. Marks: 100

PART – A (20 × 1 = 20 Marks)   Marks BL CO PO

Answer **ALL** Questions

1. The standard penetration test is used to determine   1 1 1 1
   (A) End bearing resistance   (B) Frictional resistance
   (C) End bearing and frictional   (D) Safe bearing pressure
       resistance

2. The inside clearance of the sampler should be   1 1 1 1
   (A) Lie between 1 to 3%   (B) Less than 1%
   (C) Lie between 2 to 6%   (D) Lie between 1 to 6%

3. The best suitable method of boring for making holes in hard soil, rocks and boulders is _____.   1 1 1 1
   (A) Auger boring   (B) Auger and shell boring
   (C) Wash boring   (D) Percussion drilling

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

5. Which of the following shear failure comes under the category of sudden catastrophic failure?   1 1 2 1
   (A) Genear shear failure   (B) Punching shear failure
   (C) Local shear failure   (D) Dense shear failure

6. What is the value of bearing capacity factor N_C of pure cohesive soil as for Terzaghi's method?   1 1 2 1
   (A) 5.14   (B) 5.7
   (C) 7.5   (D) 9

7. What is the value of shape factor $S_c, S_q \& S_\gamma$ for circular base as per IS 6305 code method?   1 1 2 1
   (A) 1.3, 1.2, 0.8   (B) 1.3, 1.2, 0.6
   (C) 1.3, 1.2, 1.0   (D) 1.2, 1.3, 1.0

8. As per Terzaghi's method, the ultimate bearing capacity for square footing is given by   1 2 2 1
   (A) $CN_c + \gamma DN_q + 0.5\gamma BN_\gamma$ (B) $CN_c + \gamma DN_q + 0.3\gamma BN_\gamma$
   (C) $1.3CN_c + \gamma DN_q + 0.5\gamma BN_\gamma$ (D) $1.3CN_c + \gamma DN_q + 0.4\gamma BN_\gamma$

9. In the slope stability analysis, the Swedish slip circle method of slices is applied to   1 1 3 1
   (A) Cohesive soil   (B) Cohesionless soil
   (C) c-ϕ soil   (D) Silty soil

10. The permissible settlement is the maximum in the case of   1 1 3 1
    (A) Isolated foundation on sand   (B) Isolated foundation on clay
    (C) Raft foundation on sand   (D) Raft foundation on clay

11. The compression of soil occurs due to the rearrangement of soil particles is called as _____.   1 1 3 1
    (A) Immediate settlement   (B) Primary settlement
    (C) Secondary settlement   (D) Tertiary settlement

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

13. Which one of the following is the classification of pile based on method of load transfer?   1 1 4 1
    (A) Driven pile   (B) End bearing pile
    (C) Bored pile   (D) Under reamed pile

14. As per IS2911, the allowable load on a single pile for under reamed pile is taken as   1 1 4 1
    (A) 7.5% of bulb diameter   (B) 8.5% of bulb diameter
    (C) 10% of bulb diameter   (D) 12% of bulb diameter

15. The area used to calculate the frictional resistance in a pile is   1 1 4 1
    (A) Cross sectional area   (B) Base area
    (C) Circumferential area   (D) Edge area

16. The negative skin friction will occur in which type of soil   1 1 4 1
    (A) Recent fills   (B) Compacted fills
    (C) Consolidated fills   (D) Compacted back fills

17. The lateral earth pressure exerted by the soil when the retaining wall moves away from the backfill is known as   1 1 5 1
    (A) Earth pressure at rest   (B) Active earth pressure
    (C) Passive earth pressure   (D) Total earth pressure

18. The failure of the finite slope occurs through the base, is known as _____.   1 1 5 1
    (A) Base failure   (B) Toe failure
    (C) Slope failure   (D) Translational failure

19. The coefficient of passive earth pressure foe cohesionless soil is given by   1 1 5 1
    (A) $1 - \sin\phi / 1 + \sin\phi$ (B) $1 + \sin\phi / 1 - \sin\phi$
    (C) $1 + \cos\phi / 1 - \cos\phi$ (D) $1 + \sin\phi / 1 - \cos\phi$

20. Which of the following is correct one for the coefficient of lateral earth pressure?   1 1 5 1
    (A) $k_a < k_o < k_p$ (B) $k_o < k_a < k_p$
    (C) $k_a > k_o > k_p$ (D) $k_o > k_a > k_p$

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

	Marks	BL	CO	PO

21. What are the design features affecting the sample disturbance?   4 2 1 1

22. Differentiate the representative and non-representative soil samples.   4 2 1 1

23. List out any four methods to improve the bearing capacity of soil.   4 2 2 1

24. List out the conditions to prefer the trapezoidal combined footing.   4 2 3 1

25. Classify the piles according to the method of installation.   4 2 4 1

26. What are the causes of slope failure?   4 2 3 1

27. Determine the critical depth of the retaining wall 12 m high with a smooth vertical back retains a pure cohesive soil of cohesion 10 kN/m² and unit weight of soil is 20 kN/m³?   4 4 5 2

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO

28. a. List out the methods of soil explorations. Explain in detail about the wash boring method of advancing borehole procedure with neat sketch.   12 2 1 2

(OR)

b. Explain the procedure of conducting the standard penetration test with neat sketch. What are the various corrections applied on SPT values?   12 2 1 2

29. a. Determine the safe bearing capacity of a square footing 2.1 m × 2.1 m placed at a depth of 1.5 m in a soil with the C = 15 kPa, ϕ = 20°. Take $N_c' = 11.8, N_q' = 3.9, N_\gamma' = 1.7, \gamma = 17.5 kN/m^3, \gamma' = 11 kN/m^3$. What is the change in safe bearing capacity if the water table rises to 0.5 m above the base of the footing? Take a factor of safety = 3.   12 3 2 2

(OR)

b. Explain the plate load test procedure in detail with neat sketch.   12 2 2 2

30. a. Proportion a rectangular combined footing for uniform pressure under dead load + reduced live load with the following data. The centre to centre distance between the columns is 5.2 m. Projection beyond the column A not to exceed 0.5 m.   12 4 3 2