Mark Scored:

KATHMANDU UNIVERSITY
End Semester Examination
August/September, 2017

AUG 30 2017

Level : B. E.
Year : III
Course : CIEG 309
Semester : II

Exam Roll No. :
Time: 30 min
F. M. : 10

Registration No.:
Date :

SECTION "A"
[20 Q × 0.5 = 10 marks]

Choose the most appropriate answer.

1. In deep foundation the depth to width ratio is usually greater than _____
   a. 4 to 5 b. 5 to 6 c. 6 to 7 d. 7 to 8

2. The usual size of test pit is about the diameter of _____ meters and the depth is limited to _____ meters.
   a. 0.5, 4 b. 1.5, 5 c. 1.5, 6 d. 2, 8

3. The area ratio of a sampling tube given the outside diameter of 100 mm and inside diameter of 94 mm is
   a. 9.4 % b. 10 % c. 13.2 % d. 26.4%

4. The height of unsupported cut in case of cohesive soil is
   a. $4c/\gamma$ b. $4\gamma/c$ c. $2c/\gamma$ d. $2\gamma/c$

5. A 10 m tall wall with a smooth vertical back retains a mass of moist cohesionless sand that has horizontal surface. The sand weighs 1.5 gm/cc and has an angle of internal friction of 36°. The total earth pressure at rest is
   a. 60.3 kN/m^2 b. 61.8 kN/m^2 c. 69.0 kN/m^2 d. 63.0 kN/m^2

6. In clayey soils, the slope of the line joining the lower adjacent edge of the upper footing and upper adjacent edge of the lower footing should not be steeper than
   a. Two horizontal to one vertical b. three horizontal to one vertical
   c. Two horizontal to two vertical d. one horizontal to two vertical

7. Rise of water table above the ground surface causes
   a. Equal increase in pore water pressure and total stress
   b. Equal decrease in pore water pressure and total stress
   c. Increase in pore water pressure but decrease in total stress
   d. Decrease in pore water pressure but increase in total stress

8. If the coefficient of the active pressure K_a is 1/3, the coefficient of passive pressure K_p, is
   a. 1/3 b. 2/3 c. 1 d. 3

9. For Strip Spread Footings, Length (L) to width (B) ratio, is
   a. $L/B < 10$ b. $L/B \geq 10$ c. $L/B = 1$ d. L/B is negligible

10. Which of the following statements is correct?
    a. The settlement of rigid footing on cohesion less soil is uniform throughout.
    b. The settlement of flexible footing on cohesive soil is less in the center than at the edges.
    c. The settlement of flexible footing on cohesion less soil is more in the center than at the edges.
    d. The settlement of rigid footing on cohesive soil is uniform throughout.

11. The best way to avoid damage from expansive soils is :
a. To give a shallow foundation
b. To give a pile foundation
c. To give foundation beneath the water zone
d. To use of cobbles

12. Which of the following is deep foundation?
a. Mat foundation b. Strip Footing c. Rock Anchor d. Cassion

13. As per the Fled's Rule, the efficiency for pile group having square configuration with each pile located in the corners is
a. 0.915 b. 0.815 c. 0.770 d. 0.615

14. During SPT Test, which of the following is NOT the condition for "Refusal"?
a. 50 blows are required for any 150 mm penetration
b. 100 blows are required for 300 mm penetration
c. 10 successive blows produce no advance
d. 5 successive blows produce no advance

15. The standard penetration test is useful to measure
a. Shear strength of soft clays
b. Shear strength of sands
c. Consistency of clay
d. Plasticity indeed of clay

16. The active pressure caused by a cohesionless backfill on a smooth vertical retaining wall may be reduced by
a. Compacting the backfill
b. Providing a surcharge load on the backfill
c. Saturating the backfill with water
d. Providing additional load on the vertical retaining wall

17. A shallow foundation is usually defined as a foundation which has
a. Depth less than 0.6 m
b. Depth less than its width
c. Depth less than 1.0 m
d. Depth greater than 1.0 m

18. Greater skin friction
a. Retards the sinking of well
b. Accelerates the sinking of well
c. Does not affect the sinking of well
d. Retardation and acceleration of sinking of well is proportional to the adhesion factor

19. The settlement of a group of friction piles as compared to that of a single pile is
a. Same b. Less c. More d. Not comparable

20. Select the correct statement
a. Both negative skin friction and skin frictional resistance are caused by relative settlement of soil
b. Both negative skin friction and skin frictional resistance are caused by relative settlement of pile
c. Negative skin friction is caused by relative settlement of soil and skin frictional resistance is caused by relative settlement of pile.
d. Negative skin friction is caused by relative settlement of pile and skin frictional resistance is caused by relative settlement of soil.

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SECTION "B"
[5Q × 8 = 40 marks]

Attempt *ALL* questions. Assume the necessary data.

1. a. What are the field tests carried out for geotechnical investigation? List any two and illustrate the methods. [4]
   b. What are the contents presented in the report of soil investigation? Prepare a sample bore hole log. [4]

2. a. Explain earth pressure at rest, active earth pressure and passive earth pressure with necessary illustrations. [4]
   b. A pile group consists of 1600 piles is driven into a clay deposit. The piles are arranged in square configuration, ie, 40 piles in each direction. The centre to centre distances between the piles in both directions are 0.6 m. The length of the pile is 10 m and diameter is 0.25 m. The average undrained shear strength along the length of the pile is 40 kN/m^2 and the adhesion factor is 0.8. Determine the safe load capacity of the block assuming the pile group behaves as a block. [4]

3. A frictionless wall AB is shown in Figure 1. Determine the active force, and the location of active force after the tensile crack occurs. Also calculate the passive resistance, on the backfill and the location of the resultant passive force. [8]

4. a. A strip footing 1.2 m wide is supported on a soil with its base at a depth of 1 m below ground surface. The soil properties are:
   $c = 15$ kN/m^2, $\phi = 28°$, $\gamma = 18$kN/m^3
   $N_c' = 16$, $N_q' = 8$ and $N_\gamma' = 4$
   Determine the ultimate bearing capacity if, [4]
   i. Water table is at great depth
   ii. Water table is at the base level of footing
   iii. Water table is at the ground surface
   b. The plan of a mat foundation with 9 columns is shown in the Figure 2. Assuming the mat to be rigid, determine the soil pressure distribution at points A, B, C and D. All the columns are of the size of 0.5 m × 0.5 m. [4]

5. A 7.0 m deep excavation is to be made using anchored sheet pile wall. The tie rod is placed at a distance 1.20 m from the top with spacing as 1.0 m/cc. The soil consists of sand with angle of internal friction as 30° and unit weight of soil is 18.5 kN/m^3. Determine the depth of penetration assuming the contraflexure to be at a depth of 0.75 m from the dredge line. [8]

FIGURES

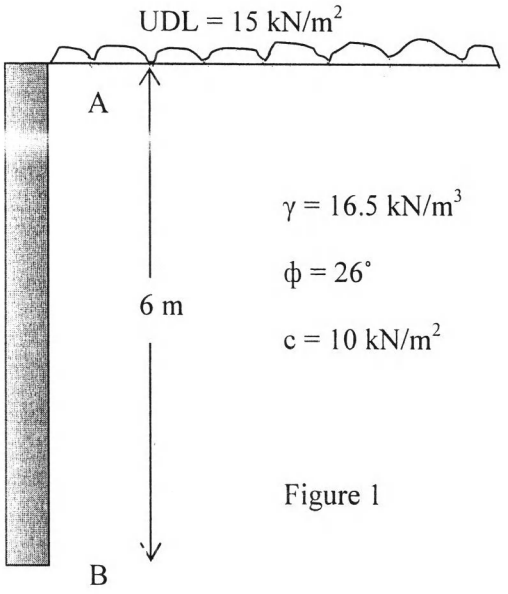

Figure 1

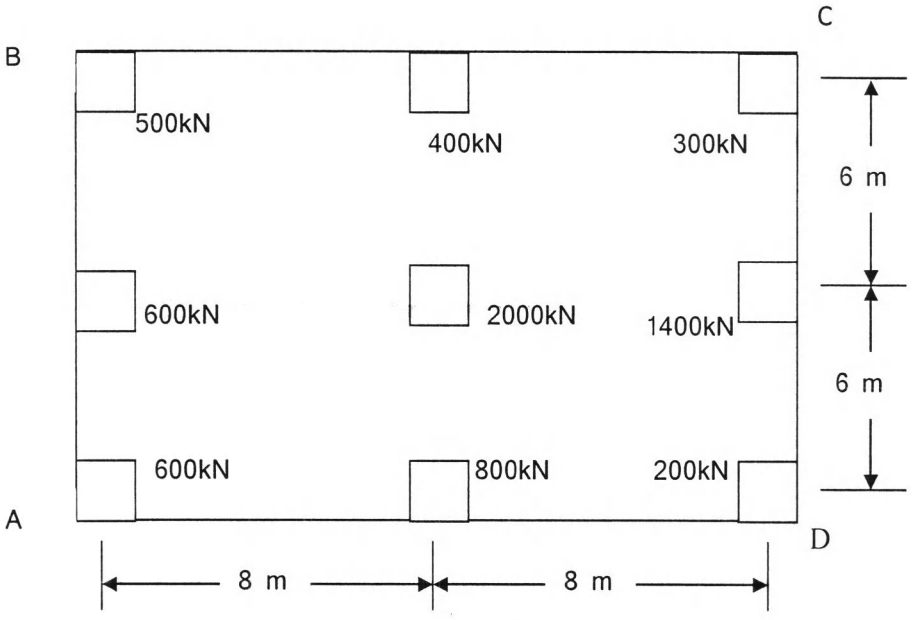

Figure 2