Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CE305

Course Name: GEOTECHNICAL ENGINEERING - II

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) State any 3 assumptions in Boussinesq's equation (3)

b) Determine the vertical stress intensity at a point 3 m below ground level and 2.5 cm away from the line of action of a vertical point load of 150kN acting on the ground surface by Boussinesq's equation. (8)

c) State two important differences between Rankine's and Coulomb's earth pressure theories. (4)

2 a) Define active earth pressure. Explain how the intensity of earth pressure exerted by a backfill depends on the movement of wall. (4)

b) A retaining wall with a vertical smooth back is 6 m high. It supports a cohesion less soil (γ = 19kN/m3, ϕ =30˚). The surface of the soil is horizontal and carries a surcharge of 15kPa. Determine the active thrust on the wall. (8)

c) What is the use of Newmark's chart? Explain the procedure for using the chart. (3)

3 a) Define depth of tension crack in cohesive soils and derive an expression for its evaluation. (4)

b) A 4 m high retaining wall contains a cohesion less backfill having the following properties: γ = 16 kN/m^3, γsat =19 kN/m^3,ϕ = 35˚. The water table is 1.5 m below the top of the backfill. Determine the total active thrust exerted by the backfill. (8)

c) Define isobar and specify its practical significance. (3)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Distinguish between general and local shear failure of shallow foundations (4)

b) A square footing of width 2.00 m is constructed at 1.20 m below the ground level in a homogeneous dry sand (γ = 17kN/m^3, ϕ = 30˚). Determine the safe bearing capacity of footing against shear failure with factor of safety 3. N_c =65.4, N_q = 49.4, N_γ = 5.4 (7)

c) With a neat sketch of well foundation mark the various components of well foundation. (4)

5 a) Define the terms safe bearing capacity and allowable bearing capacity (3)

b) Determine the ultimate bearing capacity of a strip footing 1.2 m wide and having the depth of foundation of 1.0 m. The water table reaches at the ground surface (8)

during rainy season. (γsat = 19 kN/m^3, C = 15 kN/m^2, N_c =57.8, N_q = 41.4 and N_γ = 42.4).

c) What are the two criteria for design of rectangular combined footings ? (4)

6 a) Design a rectangular combined footing to support two adjacent columns (size 40 cm x 40 cm). The centre lines of the columns are placed on footing at a distance of 5. 0 m between them. The boundary is 0.5 m away from centre line of column A. The column A and B carry load of 3 MN and 4 MN respectively. The allowable soil pressure is 400 kN/m^2. (8)

b) State any two major problems in well sinking and describe any two methods to correct them. (4)

c) What are the limitations of Terzhaghi's bearing capacity theory? (3)

PART C

Answer any two full questions, each carries 20 marks.

7 a) A 50 cm concrete pile is driven in a normally consolidated clay deposit 15 m thick. Cu = 70 kN/m^2, α = 0.9 and Factor of safety is 2.0. Estimate the safe load. (5)

b) List five major objectives of site investigation. (5)

c) What is negative skin friction? What is its effect on the pile capacity? (6)

d) What are corrections applied to standard penetration test value? (4)

8 a) Write IS guide lines for choosing spacing of boreholes (3)

b) Write any two advantages of auger boring compared to wash boring. (4)

c) A bored pile in a clayey soil failed at an ultimate load of 400kN. If the pile is 50 cm diameter and 10 m long, determine the capacity of a group of nine piles spaced 1 m centre to centre both ways. Take Cu = 70 kN/m^2 and α = 0.5. (8)

d) Write Modified Hiley formula and describe each terms in the formula (5)

9 a) What is meant by vibration isolation? List two methods of vibration isolation of footings (3)

b) Determine the natural frequency of a machine foundation having base area 2.2 m x 2.2 m and a mass of 15200kg, including the mass of the machine. Taking Cu = 4x10^4 kN/m^3 . (5)

c) Explain the procedure of determination of safe load from static pile load test (12)

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