Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: CE305

Course Name: GEOTECHNICAL ENGINEERING – II (CE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks Marks

1 a) A water tank is founded on a circular ring type of foundation. The ring is of 2.5m width and its external diameter is 10m. Compute the vertical stress at 2.5m depth beneath the centre of the foundation, if pressure on the foundation is 100kPa. (8)

b) A rectangular footing of size 3m × 2m carries a uniform intensity of loading equal to 100kPa. Determine the vertical stress at 5m depth below the midpoint of a short edge of the footing, using the following data: (7)

m	n		
	0.2	0.4	0.6
0.2	0.0179	0.0328	0.0435
0.4	0.0328	0.0602	0.0801
0.6	0.0435	0.0801	0.1069

2 A 6m high retaining wall supports a two-layered backfill having the following characteristics.Top layer: cohesion=10kPa; angle of internal friction=30^0; unit weight of soil=18kN/m^3; thickness=3m; Bottom layer: cohesion=0.0; angle of internal friction=41.8^0; unit weight of soil=19.2kN/m^3. Determine the totalearth pressure and its location, if tension cracks are likely to develop in the field. (15)

3 a) In spite of a few inherent limitations, the Boussinesq's theory for determination of vertical stress is still widely used. Why? (2)

b) Determine the increase in vertical stress at a depth of 3m beneath the centre of a 2m wide strip footing, if the intensity of loading on the footing is 100kPa. (5)

c) An excavation is to be carried out in a soil having: cohesion=8kPa; angle of internal friction=30^0; unit weight of soil=18.5kN/m^3. What is the maximum depth up to which excavation can safely be done without the sides caving in? (4)

d) State the assumptions in Rankine's theory. (4)

PART B

Answer any two full questions, each carries 15 marks

4 Determine the safe load that can be carried by a circular footing [diameter=1.5m] founded at a depth of 0.9m in a soil with cohesion=55kPa and angle of internal friction=10^0. Water table is at a depth of 2.8m beneath the ground surface. However, the soil above water table is also saturated [γ_{sat}=17kN/m^3] due to capillarity. Nc=9.6; Nq=2.7; Nγ= 1.2. Assume general shear failure to materialise in the field and take factor of safety against shear failure as 3. What will be the %reduction in net safe bearing capacity, if water table rises to the ground surface? (15)

5 a) Mention any one practical situation wherein trapezoidal combined footings are preferred to rectangular combined footings. (2)

b) Design the plan dimensions of a combined footing for the following data: size of columns=300mm×300mm; column loads=1075kN & 925kN; centre to centre distance between columns=4m; clear space available beyond the outer face of both columns=0.10m. Safe bearing capacity=178kPa (13)

6 a) What type of shear failure can be expected for footings, if the subsoil consistsof dense homogeneous coarse grained soil? Draw the typical pressure versus settlement curve of in such a situation. (5)

b) State any 3 causes of differential settlement. (3)

c) Suggest any 3 methods for rectification of tilts of well foundations. Draw neat sketches to illustrate the same. (7)

PART C

Answer any two full questions, each carries20 marks

7 a) State the I.S. guidelines for estimation of safe load on a single pile, from pile load test results. (4)

b) Clearly differentiate between "initial test" and "routine test" on pile. What is meant by a working pile? (6)

c) A square concrete pile[400mm×400mm] is proposed to be installed in a homogeneous clay stratum[unconfined compression strength=100kPa; unit weight of soil=18kN/m^3; adhesion factor=0.4] to carry a safe load of 233kN., with a factor of safety of 2.5 against shear failure. Design the required length of pile. (10)

8 a) Mention the following aspects related to correctionsto be applied for observed SPT values: Name of the two corrections to be applied, applicable soil types, method of computation. (8)

b) Mention any 2 soils in which auger boring method of soil exploration can be effectively carried out? Also mention applicable depths, and any one limitation of the method. (5)

c) Differentiate between free vibration and forced vibration. (4)

d) Mention any two methods of vibration isolation. (3)

9 a) Write down the procedure for determination of safe load on a single pile in sands. (10)

b) Coefficient of elastic uniform compression(C_u) is needed for finding the natural frequency of foundation-soil system. Mention the factors controlling C_u. (3)

c) State the I.S. guidelines for choosing the minimum number of borings in a soil exploration programme. Find the minimum number of boreholes for a rectangular plot of size 40m ×300m. (7)

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