Seat No : ____________ Enrollment No: ________________

GUJARAT TECHNOLOGICAL UNVERSITY

BE- VIth SEMESTER–EXAMINATION – MAY- 2012

Subject code: 160606 **Date: 22/05/2012**
Subject Name: Geotechnical Engineering-II
Time: 10:30 am – 01:00 pm **Total Marks: 70**

Instructions :
(1) All questions are compulsory.
(2) Figures to the right indicate the marks.
(3) Use of Programmable calculator is strictly prohibited.
(4) Draw neat sketch wherever necessary.

Q.1 (a) Explain Plate load test. 07

(b) A square footing 2m x 2m carries a uniformly distributed load of 314 kN/m². find the intensity of vertical pressure at a depth of 6 m below a point 0.5 m inside each of the two adjacent side of footing. 07

Q.2 (a) A square footing 2.5 m X 2.5 m is built on a homogeneous bed of sand of density 19 kN/m^3 having an angle of shearing resistance of 36^o. The depth of foundation is 1.5 m below the ground surface. Calculate the safe load that can be applied on the footing with a factor of safety of 3. Take bearing capacity factors as N_c= 27, N_q = 30, N_γ = 35. 07

(b) Differentiate between General shear failure and Local shear failure with neat sketch. 07

OR

(b) Enlist factor affecting the bearing capacity and explain any two in detail. 07

Q.3 (a) Write about piles accordingly to method of installation and their load carrying characteristics. 07

(b) A 40 cm square pre-cast RCC pile is driven by 9 m into a sandy bed. The standard penetration test results, performed on this ground are given below 07

Depth(m)	1.5	3	4.5	6	7.5	9	10.5	12
SPT-N values	4	6	12	12	20	24	35	39

Compute the factor of safety available if 1100 kN of compressive load is applied on this pile.

OR

Q.3 (a) A load test has been carried out on a 30 cm dia RCC precast pile already driven into the ground. The results obtained are tabulated below : 07

Load (t)	40	80	120	140	160	170
Penetration(mm)	3	5	10	21	32	37.5

(a) Determine the allowable compressive load in kN that you would recommend for a general case.

(b) Determine the allowable load(kN) if the settlement rate at twice the design load is restricted to 1/40 cm/t. Also determine the allowable load if the pile is not allowed to settle more than 2 cm under normal load and 5 cm under twice the load.

(b) In a 16 pile group, the pile diameter is 0.4 m and c.c spacing of piles in the square group is 1.5 m. If c_u=50 kN/m², determine whether the failure would occur as block failure or when the piles act individually. Neglect bearing at the 07 tip of the pile. All piles are 12 m long. Take m=0.7 for shear mobilization around each pile. Also determine the safe load on this group.

Q.4 (a) Explain about earth pressure at rest. 07

(b) Calculate the total active thrust on a vertical wall 5 m high, retaining a sand of density 1.7 gm/cc for which Φ = 35°, the surface of the sand is horizontal and the water-table is below the bottom of the wall. 07

OR

Q.4 (a) A counterfort wall of 10 m height retains non-cohesive back fill. The void ratio and angle of internal friction of the back fill respectively are 0.7 and 30°, in the loose state, and they are 0.40 and 40° in the dense state. Calculate and compare active earth pressure in both the states. Take specific gravity of soil grains as 2.7. 07

(b) Enlist graphical methods of determination of lateral earth pressure and explain any one in detail. 07

Q.5 (a) Discuss about stability analysis of Infinite slopes for c-Φ soils. 07

(b) A 8 m deep cutting has side slopes of 1½H:1V. The soil was tested and found to have the following properties c= 24.5 kN/m² ,e =0.8, Φ=14°. Determine the factor of safety w.r.t. cohesion, against failure of the slope, when water level in the cur rises up to full height. Given G = 2.7 and for ß =34° stability number (N) are 07

Φ	N
6°	0.122
7°	0.116
14°	0.074

OR

(a) Explain swidish circle method of stability analysis. 07

(b) A 12 m high embankment is inclined on sides at angle of 30° to the horizontal. If the shear strength parameters of the soil are given as c = 15kN/m² and Φ=20°, find the factor of safety available against slope failure. The unit weight of the soil is also known as equal to 18kN/m^3. Stability number (Sn) = 0.025 07

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