

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – SUMMER 2013****Subject Code: 160606****Date: 04-06-2013****Subject Name: Geotechnical Engineering II****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Write in short Methods of site Exploration. **07**
 (b) A strip footing of 2 m width is placed at a depth of 4 m below the ground surface. Determine the net ultimate bearing capacity using, 1) Terzaghi's equation, 2) Skempton's equation and 3) IS code. The unit weight of soil (clay) is 20 kN/m³ and cohesion $c = 10$ kN/m². **07**

- Q.2** (a) Describe Negative skin friction. **07**
 (b) An 11 m long pile of 40 cm diameter has a bell of 2 m diameter and 1 m height. If the soil has $\phi = 25^\circ$, $c_u = 20$ kN/m² and $\gamma = 19$ kN/m³, find allowable pull out resistance. Factor of safety = 3. **07**

OR

- (b) Explain in detail Under Reamed Pile. **07**

- Q.3** (a) Which factors affect the bearing capacity of soil? Explain any two in detail. **07**
 (b) A strip footing 2 m wide carries a load intensity of 400 kN/m² at a depth of 1.2 m in sand. The soil properties are: $\gamma_{sat} = 19.5$ kN/m³ and $\gamma_b = 16.8$ kN/m³, $\phi = 35^\circ$. Determine the factor of safety w.r.t shear failure. For case (a) water table is 4 m below GL (b) water table at GL. For $\phi = 35^\circ$, $N_q = 41.4$ and $N_c = 42.4$. **07**

OR

- Q.3** (a) A pile 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

Determine the allowable compressive load in kN that you would recommend.

- (b) Derive the Boussinesq's equation of vertical stress and tangential stress due to concentrated load applied on the ground. **07**

- Q.4** (a) How will you get the stability of Infinite slopes for $c-\bar{u}$ soils? **07**
 (b) Calculate the factor of safety with respect to cohesion, of a clay slope laid at 1 in 2 to a height of 10 m, if the angle of internal friction = $\phi = 10^\circ$, $c = 25$ kN/m², and $\gamma = 19$ kN/m³. What will be the critical height of the slope in this soil? Use following information for S_n .
 $\phi = 15^\circ$, $i = 26.5^\circ$ $S_n = 0.060$
 $\phi = 10^\circ$, $i = 26.5^\circ$ $S_n = 0.064$ **07**

OR

- Q.4** (a) Write short note on Newmark's Influence Chart. **07**
 (b) Explain Swedish circle method of stability analysis. **07**

- Q.5** (a) Explain Culmann's graphical method for active pressure. **07**
(b) A retaining wall of 4 m high which retains sand has a smooth vertical back. **07**
The backfill has a level with the top of the wall. There is a uniformly distributed surcharge load of 36 kN/m², intensity over backfill. The unit weight of the backfill is 18 kN/m³, its angle of shearing resistance is 30°. Determine the magnitude and point of application of active earth pressure per meter length of the soil.

OR

- Q.5** (a) 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 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. **07**
(b) 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**
