Seat No.: _____ Enrolment No._____

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 ñMethods of site Explorationò. **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) Terzaghiôs equation, 2) Skemptonôs equation and 3) IS code. The unit weight of soil (clay) is 20 kN/m^3 and cohesion c = 10 kN/m^2. **07**

Q.2 **(a)** Describe ñNegative skin frictionò. **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 Ø = 25º, c_u = 20 kN/m^2 and ɔ = 19 kN/m^3, find allowable pull out resistance. Factor of safety = 3. **07**

OR

(b) Explain in detail ñUnder Reamed Pileò. **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 400kN/m^2 at a depth of 1.2 m in sand. The soil properties are: $ɔ_{sat}$ = 19.5kN/m^2 and $ɔ_b$ = 16.8kN/m^2, Ø = 35º. 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 Ø = 35º , Nq = 41.4 and Nɔ = 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 ñBoussinesqôs 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-ū 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 = Ø 10º, c = 25 kN/m^2, and ɔ = 19 kN/m^3. What will be the critical height of the slope in this soil? Use following information for Sn. **07**

Ø = 15º, i = 26.5º Sn = 0.060

Ø = 10º, i = 26.5º Sn = 0.064

OR

Q.4 **(a)** Write short note on ñNew-markôs Influence Chartò. **07**

(b) Explain Swedish circle method of stability analysis. **07**

Q.5 **(a)** Explain Culmannôs graphical method for active pressure. **07**

(b) A retaining wall of 4 m high which retains sand has a smooth vertical back. The backfill has a level with the top of the wall. There is a uniformly distributed surcharge load of 36 kN/m^2, intensity over backfill. The unit weight of the backfill is 18 kN/m^3, its angle of shearing resistance is 30^0. Determine the magnitude and point of application of active earth pressure per meter length of the soil. **07**

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/m^2, 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**

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