Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER 2014

Subject Code: 160606 **Date: 30-05-2014**

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)** Differentiate between Finite and Infinite slope. Explain the method of checking the stability of a finite slope by Swedish method of Slices for a Cohesive frictional soil. **07**

(b) An embankment is inclined at an angle of 40˚ and its height is 10m. The angle of shearing resistance is 20˚ and cohesion intercept is 100 kPa. The unit weight of soil is 19 kN/m$^{3.}$ If the Taylor stability number is 0.06, find the factor of safety with respect to cohesion. **07**

Q.2 **(a)** Write short notes on **07**

I. Active and passive earth pressure,
II. Rankine's earth pressure theory,
III. Mohr circle diagram for active and passive state.

(b) A Retaining wall with a smooth vertical back retains a purely cohesive fill. Height of wall is 11m. Unit weight of fill is 20 kN/m$^{3.}$ Cohesion is 10kPa and Φu = 00˚. What is the total active Rankine thrust on the wall? At what depth is the intensity of pressure zero and where does the resultant thrust act? **07**

OR

(b) **07**

A retaining wall 5.0 m high with a smooth vertical back retains a dry sandy backfill of unit weight 18 kN/m^3 and Φ = 30˚. The backfill carries a uniformly distributed load of 10 kPa. Find by Rankine's theory the total active pressure per m length of the wall and its point of application above the base. If the water table rises behind the back of the wall to an elevation of 2.0 m below the top of the wall, what is the change in the total active pressure per m of the wall? Assume no change in Φ.

Q.3 **(a)** What are the basic assumptions in Boussinesq's theory of stress distribution in soils? Show the vertical stress distribution on a horizontal plane at a given depth. Explain pressure bulb. **07**

(b) A concentrated load of 50kN acts on the surface of a homogeneous soil mass of large extent. Find the stress intensity at a depth of 5m and **07**

a) Directly under the load, and
b) At a horizontal dist of 5m. Use Boussinesq's equation.

OR

Q.3 **(a)** Describe the standard penetration test used in soil exploration. List the information that can be obtained by the test when made in (i) clay, (ii) sand. **07**

Comment on the correction factor for N- values for the dry sand and submerged fine sand.

(b) Compute the area ratio of a thin walled tube sampler having an external diameter of 100 mm and a wall thickness of 2.0 mm. Do you recommend the sampler for obtaining undisturbed soil samples? Why? **07**

Q.4 **(a)** Discuss the various factors that affect the bearing capacity of a shallow footing. How do you ascertain whether a footing will fail in local or general shear failure? **07**

(b) Compute the safe bearing capacity of a square footing 2.0 m*2.0 m, located at a depth of 1.5 m below the ground level in a soil of unit weight 19 kN/m^3,Φ = 20°, N_c = 17.7, N_q =7.4, N_γ =5.0. Assume a suitable factor of safety. The water table is very deep. If the water table touches the base of the footing, find the reduction in safe bearing capacity. **07**

OR

Q.4 **(a)** Explain general and local shear failure. Bring out clearly the effect of water table on the bearing capacity of a footing. **07**

(b) A strip footing 1.4 m wide, rests on the surface of a dry cohesionless soil having Φ = 20°,and γ = 18 kN/m^3 . If the water table rises temporarily to the surface due to flooding, calculate the percentage reduction in the ultimate capacity of the soil. Assume N_γ = 5.0. **07**

Q.5 **(a)** What do you mean by pile group efficiency? What are the various formulae to find it? **07**

(b) A Square pile (3*3=9 piles) are embedded in clayey bed (Cu = 100 kPa). The c/c spacing is kept as 3d. The length and diameter of the pile are 10m and 0.3m respectively. If α = 0.6, calculate the pile group capacity considering it as friction pile group. **07**

OR

Q.5 **(a)** What is the basis on which the dynamic formulae are derived? Mention two well known dynamic formulae and explain the symbols involved. **07**

(b) A 30 cm diameter pile, 15 m long, is driven in a deposit of medium dense sand (Φ = 36°,N_γ =40, N_q =42). The unit weight of sand is 15 kN/m^3. What is allowable load with factor of safety 3? Assume lateral earth pressure coefficient = 0.6. **07**

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