

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 $\Phi_u = 0.0^\circ$. 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)** 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 $\Phi = 30^\circ$. 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 . **07**

- 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. 07
Do you recommend the sampler for obtaining undisturbed soil samples? Why?

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 , $\Phi = 20^\circ$, $N_c = 17.7$, $N_q = 7.4$, $N_\gamma = 5.0$. 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 $\Phi = 20^\circ$, and $\gamma = 18 \text{ kN/m}^3$. If the water table rises temporarily to the surface due to flooding, calculate the percentage reduction in the ultimate capacity of the soil. Assume $N_\gamma = 5.0$. 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 ($C_u = 100 \text{ kPa}$). The c/c spacing is kept as 3d. The length and diameter of the pile are 10m and 0.3m respectively. If $\alpha = 0.6$, 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 ($\Phi = 36^\circ$, $N_\gamma = 40$, $N_q = 42$). 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
