

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI- EXAMINATION – SUMMER 2016****Subject Code:160606****Date:13/05/2016****Subject Name:Geotechnical Engineering - II****Time: 10:30 AM to 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 43° 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) Differentiate between the Boussinesq's theory & Westergaard's theory of stress distribution in soils. Use Boussinesq's theory and compute vertical stress values on a vertical plane located at radial distance of 1.0m away from a 200 kN point load acting at GL. Compute the values at 2.0m, 3.0m & 4.0m depths. **07**

(b) A concentrated load of 100 kN acts on the surface of a homogeneous soil mass of large extent. Find the stress intensity at a depth of 5m and

- a) Directly under the load, and
- b) At a horizontal dist of 5m. Use Boussinesq's equation. **07**

OR

Q.3 (a) Describe the standard penetration test used in soil exploration. Also describe the corrections to be applied for submerged fine sand. **07**

(b) Compute the area ratio of an open 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. Explain the General and Punching shear failures. **07**
- (b) Compute the safe bearing capacity of a square footing 2.0 m x 2.0 m, located at a depth of 2.0 m below the ground level in a soil of unit weights $\gamma_t = 17 \text{ kN/m}^3$; $\gamma_{\text{sat}} = 19 \text{ kN/m}^3$, $C=0.0 \text{ kPa}$, $\Phi = 20^\circ$, $N_c = 17.7$, $N_q = 7.4$, $N_\gamma = 5.0$. 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 the Plate Load Test. **07**
- (b) A strip footing 1.5 m wide, rests on the surface of a cohesionless soil having $\Phi = 20^\circ$ and $\gamma_t = 16 \text{ kN/m}^3$; $\gamma_{\text{sat}} = 18 \text{ kN/m}^3$. If the water table rises temporarily to the surface due to flooding, calculate the percentage reduction in the ultimate capacity of the soil. Assume $N_c = 7.4$, $N_\gamma = 5.0$. **07**

- Q.5** (a) What do you mean by pile group efficiency? Explain any one method 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) Describe the pile load test and explain the method of calculating the allowable load. **07**
