

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (OLD) - EXAMINATION – SUMMER 2017****Subject Code: 160606****Date: 03/05/2017****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 infinite and finite slopes. How will you calculate the factor of safety for a finite slope made of C- Φ soil using Swedish method of slices? **07**
- (b) Using Swedish slip circle, calculate the factor of safety of a slope of an embankment of height 8.0 m having slope angle 45° . The properties of the soil are:- C = 10 kPa, $\Phi = 20^\circ$, $\gamma_t = 16$ kN/m³. The directional angles are 28° & 35° . Assuming slip circle passing through the toe. **07**

- Q.2** (a) Briefly explain Active earth pressure, Passive earth pressure and Earth pressure at rest. Give one example of each condition. **07**
- (b) A retaining wall of height 5.0 m has a horizontal sandy backfill (C=0.0, $\Phi = 30^\circ$, $\gamma_t = 20$ kN/m³). A surcharge of 20 kPa is acting over the backfill. Draw the active earth pressure distribution and calculate the total active thrust acting on the wall. **07**

OR

- (b) A retaining wall of height 5.0 m has a horizontal backfill with C=20 kPa, $\Phi = 20^\circ$ & $\gamma_t = 19$ kN/m³. Compute the total passive thrust acting on the wall. **07**

- Q.3** (a) Explain importance of soil investigation. Briefly explain different drilling/boring methods for soil investigation. **07**
- (b) Write a short note on Newmark's influence chart. **07**

OR

- Q.3** (a) Write a short note on Standard Penetration Test (SPT). **07**
- (b) For a point load of 150 kN acting at the ground level, compute the vertical stresses developed on a horizontal plane located at 1.0m depth. Use Boussinesqu's theory & compute the stresses for radial distances of 0.0m, 1.0m, 2.0m & 3.0m. **07**

- Q.4** (a) State different types of foundations and define the important terms Safe Bearing Capacity (SBC), Safe Bearing Pressure (SBP) & Allowable Bearing Pressure (ABP). **07**
- (b) A 1.5 m x 1.5 m size footing is placed at 2.0m depth below the ground level (GL). The Ground Water Table (GWT) lies at 4.0 m depth below the GL. Soil properties are $\gamma_t = 17$ kN/m³; $\gamma_{sat} = 18$ kN/m³; C = 0.00 kPa, $\Phi = 34^\circ$ ($N_c = 35.49$, $N_q = 23.18$, $N_r = 30.21$). Consider General Shear Failure (GSF) and compute the safe bearing capacity value. **07**

OR

- Q.4 (a)** With neat sketches describe different modes of bearing capacity failures. **07**
- Q.4 (b)** A 2.0 m x 2.0 m size footing is placed at 2.0m depth below the ground level (GL). The Ground Water Table (GWT) lies at 2.0 m depth below the GL. Soil properties are $\gamma_t = 18 \text{ kN/m}^3$; $\gamma_{\text{sat}} = 20 \text{ kN/m}^3$; $C = 0.0 \text{ kPa}$, $\Phi = 30^\circ$ ($N_c = 30.14$, $N_q = 18.40$, $N_r = 22.40$). Consider General Shear Failure (GSF) and compute the safe bearing capacity value as per IS code. **07**
- Q.5 (a)** Write a short note on 'Pile Load Test'. How will calculate the allowable load capacity ? **07**
- (b)** Design a square pile group to carry the ultimate load of 2000 kN in clay ($C_u = 70 \text{ kPa}$, $\gamma_t = 18 \text{ kN/m}^3$). The piles are 0.40 m in diameter and 8 m long. Take $\alpha = 0.6$ Check for block shear failure. **07**
- OR**
- Q.5 (a)** State different types of shallow and deep foundations. In which circumstances, pile foundation shall be adopted? **07**
- (b)** Write short notes on **07**
- (i) Negative skin friction &
 - (ii) Dynamic formulae
