

**GUJARAT TECHNOLOGICAL UNIVERSITY****B E Sem-VI Examination May 2011****Subject code: 160606****Subject Name: Geotechnical Engineering-II****Date: 24/05/2011****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)** 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) Terzaghi's equation, 2) Skempton's equation and 3) IS code. The unit weight of soil (clay) is  $20 \text{ kN/m}^3$  and cohesion  $c = 10 \text{ kN/m}^2$ . **07**

**(b)** Explain Culmann's method for stability of slope. A vertical cut is made through a homogeneous soil mass having  $c = 20 \text{ kN/m}^2$ ,  $\phi = 20^\circ$  and  $\gamma = 16.5 \text{ kN/m}^3$ . Using Culmann's method determine safe depth of the cut by using FOS = 2.0. **07**

**Q.2 (a)** Determine the active earth pressure on the retaining wall of 5 m high for following data. **07**

1. Top 2.5 m, soil  $\phi = 35^\circ$  and  $\gamma = 17 \text{ kN/m}^3$

2. Bottom 2.5 m, soil  $\phi = 38^\circ$  and  $\gamma = 18 \text{ kN/m}^3$

Water level is at 2.5 m below ground surface. Adopt  $\gamma_w = 10 \text{ kN/m}^3$ .

**(b)** What are the graphical methods available for the determination of lateral earth pressure? Explain any one in detail. **07**

**OR**

**(b)** Elaborates the shortcomings of Rankine's active earth pressure theory and Coulomb's active earth pressure theory. **07**

**Q.3 (a)** Describe plate load test with neat sketches. **07**

**(b)** What is stability number? Explain its uses in detail. **07**

**OR**

**Q.3 (a)** Explain "Types of shear failure of soil" with neat sketches. **07**

**(b)** Write short note on "Swedish Circle Method". **07**

**Q.4 (a)** How do you estimate the group capacity of piles in sand and clay? **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  $\phi = 25^\circ$ ,  $c_u = 20 \text{ kN/m}^2$  and  $\gamma = 19 \text{ kN/m}^3$ , find allowable pull out resistance. Adopt factor of safety = 3. **07**

**OR**

- Q.4** (a) Elaborate the conditions where a pile foundation is more suitable than a shallow foundation. **07**
- (b) What is negative skin friction? What is its effect on the pile? **07**
- Q.5** (a) Write short note on “New-mark’s Influence Chart”. **07**
- (b) Explain the objectives of exploration of sub surface. What are the methods available for sub surface exploration. Explain any one in detail. **07**

**OR**

- Q.5** (a) Derive an expression for the vertical stress at a point due to a point load, using Boussinesq’s theory. **07**
- (b) Elaborate the word footing and foundation. Explain the factors that effect the selection of type of foundation. **07**

\*\*\*\*\*