

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- VI (New) EXAMINATION – WINTER 2019

Subject Code: 2164003

Date: 09/12/2019

Subject Name: Geotechnical Engineering - II

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
Q.1	(a) What are disadvantages and advantages of SPT test?	03
	(b) Explain the concept of earth pressure using Mohr's circle.	04
	(c) Derive an equation to determine the factor of safety of soil under sudden drawdown condition.	07
Q.2	(a) What is negative skin friction in pile foundation?	03
	(b) Explain Terzaghi's bearing capacity theory with a neat sketch.	04
	(c) Draw the passive earth pressure diagram for the retaining wall shown in Figure 1.	07

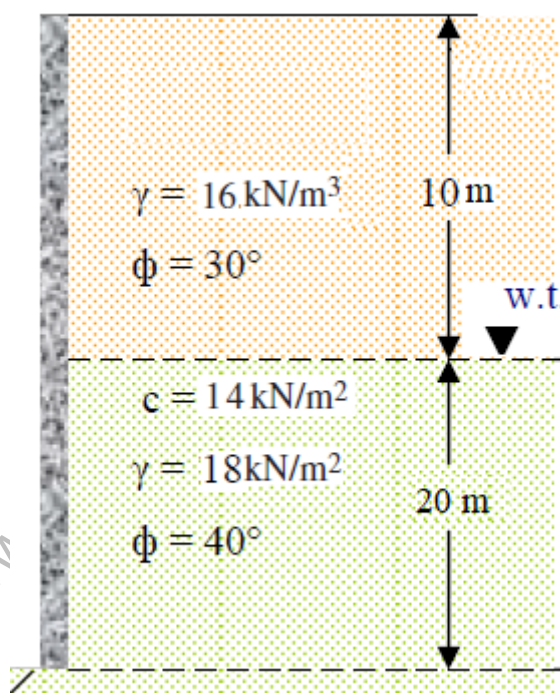


Figure 1

OR

(c)	Draw the active earth pressure diagram for the retaining wall shown in Figure 1.	07
Q.3	(a) Explain the concept of floating foundation.	03
	(b) A long natural slope of cohesion-less soil is inclined at 12° to the horizontal. What will be the factor of safety of the slope if $\phi = 30^\circ$?	04

- (c) An 8 m long and 300 mm-diameter precast concrete pile is driven into a sand with $\phi = 37^\circ$ and $\gamma = 19.0 \text{ kN/m}^3$. Estimate the maximum load allowed on the pile. $N_q = 41$, $K = 1.0$, $\delta = 1.0$ **07**
- OR**
- Q.3** (a) Explain the principles of preloading for soil treatment. **03**
 (b) Explain the mechanism of shallow foundation failure. **04**
 (c) A 500 mm-diameter and 20 meter long concrete pile is driven into the ground where the top 5 m has $c_u = 50 \text{ kPa}$, which was underlain by clay with $c_u = 200 \text{ kPa}$. Estimate the maximum load allowed safely on the pile. Assume factor of safety to be 2.5. **07**
- Q.4** (a) Describe the methods of soil sampling suitable for cohesionless and cohesive soils **03**
 (b) Explain Jumiki's method to determine center of critical circle for a c - ϕ soil. **04**
 (c) A foundation, 2.0 m square is installed 1.2 m below the surface of a uniform sandy gravel having a density of 19 kN/m^3 , above the water table and a submerged density of 10 kN/m^3 . The strength parameters with respect to effective stress are $c' = 0$ and $\phi = 30^\circ$. ($N_q = 22$ and $N_\gamma = 20$). Determine the change in gross ultimate bearing capacity if water table rises from base of footing to ground surface. **07**
- OR**
- Q.4** (a) What is difference between bearing capacity failure and shear failure? **03**
 (b) Describe the factors affecting the selection of foundation's type. **04**
 (c) A circular footing is resting on a stiff saturated clay with $q_u = 250 \text{ kN/m}^2$. The depth of foundation is 2 m. Determine the diameter of the footing if the column load is 600 kN. Assume a factor of safety as 2.5. The bulk unit weight of soil is 20 kN/m^3 . ($N_c = 5.7$, $N_q = 1$, $N_\gamma = 0$) **07**
- Q.5** (a) What is significant depth in soil exploration? **03**
 (b) What are different failure mechanism of pile foundation? **04**
 (c) Write short note on followings: **07**
 i) SCPT
 ii) Compaction piles
 iii) Hiley dynamic formulae
 iv) Pile load test
- OR**
- Q.5** (a) Explain the concept of soil reinforcement. **03**
 (b) Enlist various type of geosynthetics and provide their suitability in the field. **04**
 (c) Write short note on followings: **07**
 i) Plate load test
 ii) Pile group
 iii) Grouting techniques
 iv) wash boring
