Kafrelsheikh University
Faculty of Engineering
Department of Civil Engineering
Year: 3rd Civil. Subject: SOIL MECHANIS (2)
Name:

Date: 17 /1/2016
Time allowed: 3 hrs
Full Mark: 100
Final Exam: 2 pages
Academic Number:

--FIVE QUESTIONS IN FOUR PAGES., ----ATTEMPT ALL QUESTIONS, AND ---ANY MISSING DATA CAN BE ASSUMED.

QUESTION 1 :

A.) Explain the factor affecting the soil compaction?

B.) Describe the Proctor "Compaction Test"

C.) The following data are obtained in a compaction test. Specific gravity = 2.65

Water content %	2	4.2	5.5	6.6	7.5	10
Wet density kN/m^3	20.2	20.8	21.7	22.00	22.1	22.0

- Determine the OMC and maximum dry density. Draw 'Zero-air-void line'.

QUESTION 2 :

A.) Write notes on:

1. Rankine earth pressure theory.
2. Culmann method.

B.) A masonry retaining wall of trapezoidal section with the vertical face on the earth side is 1.5 m wide at the top and 3.5 m wide at the base and is 5.0 m high. It retains a sand fill sloping at 2 horizontal to 1 vertical. The unit weight of sand is 18 kN/m^3 and $\varphi = 30°$. Find the maximum and minimum pressure at the base of the wall assuming the unit weight of masonry as 23 kN/m^3. Find factor of safety against overturning.

QUESTION 3 :

A.) What are the design criteria to be satisfied for the stability of a gravity retaining wall?

B.) Mention the different type of retaining walls with empirical dimension.

C.) Make a complete design and draw neat sketches showing concrete dimensions and reinforcement details of the wall in Fig. (1). Factor of safety against sliding and overturning not less than 1.5.

QUESTION 4 :

A.) Explain the method of slices for stability analysis of slopes.

B.) Under what conditions (i) a base failure and (ii) a toe failure are expected? Explain

C.) The cross-section of an earth dam on an impermeable base is shown in Fig. 2. The stability of the downstream slope is to be investigated using the slip circle shown. Given: γ_{sat} = 19.50 kN/m^3, Φ = 25° , C = 9 kN/m^2, r = 9.0 m , and θ = 88 °.

QUESTION 5 :

A.) What are the criteria for deciding the depth of foundations?

B.) To obtain a higher bearing capacity, either width of the footing could be increased or the depth of foundation can be increased. Discuss critically the relative merits and demerits.

C.) A column carries a load of 1000 kN. The soil is a dry sand weighing 19 kN/m^3 and having an angle of internal friction of 35°. A minimum factor of safety of 2.5 is required

(i) Find the size of a square footing, if placed at the ground surface; and,

(ii) Find the size of a square footing required if it is placed at 1 m below ground surface with water table at ground surface. Assume γ_{sat} = 21 kN/m^3.

ø	N_c	N_q	N_γ
10	8.5	2.50	0.50
15	11	4.0	1.0
20	15	6.50	2.0
25	20.5	10.50	4.50
30	30	18.0	10.0
35	46	33.0	23.0

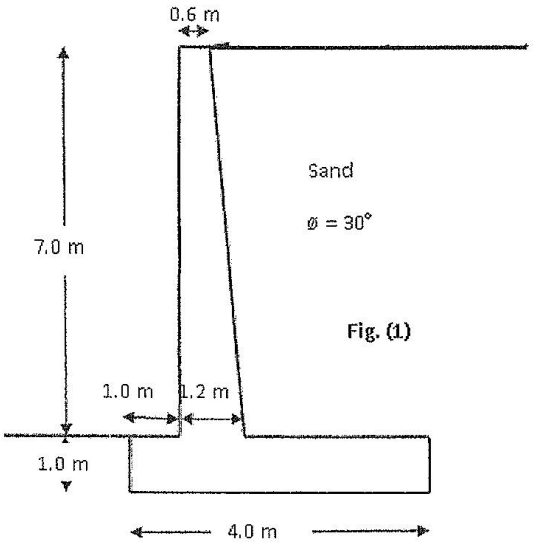

Fig. (1)

$\gamma = 1.8$ t/m^3, $\Phi = 30^o$, C $= 1.0$ t/m^2, $q_{all} = 15.0$ t/m^2

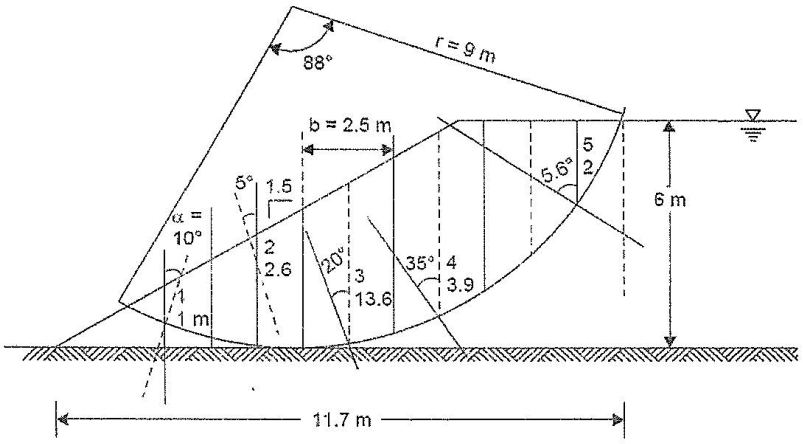

Fig. (2)

With Best Wishes