



Final Exam- Any missing data can be assumed reasonably
The answer should be in English language

Question No. 1-(15 points)

Check if which the sentence is true or false and correct the false one with explanation and sketches if needed:

- a) Many plastic clays swell considerably when water is added to them and then shrink with the loss of water.
- b) Foundations constructed on such clays are subjected to large uplifting forces caused by the swelling.
- c) In general, expansive clays have liquid limits and plasticity indices greater than about 40 and 15, respectively.
- d) Expansive or collapsible soils may not cause high differential movements in structures through excessive heave or settlement
- e) Replacing the expansive soil under the foundation should be used when the swell potential is so high
- f) Liquefaction phenomenon can be occurred for stiff clay soil.
- g) Soil reinforcement technique is not valuable in slope stability.
- h) Vibro-compaction is not valid in deep layers.
- i) Stone columns method is widely used in liquefiable soil.
- j) Well point system is working well to dewater more that 15 meters.

Question No. 2-(15 points)

Explain the following terms with neat sketches if needed

- 1. Unrestrained Swell Test
- 2. Swelling Pressure Test
- 3. Design-by-experience
- 4. Design-by-cost-and-availability
- 5. Design-by-function
- 6. Dynamic compaction
- 7. Vibro-compaction
- 8. Liquefaction and its remedial methods and where it happened?
- 9. Evaluation of liquefaction hazards.
- 10. Explain CSR and CRR for liquefaction calculations.

Question No.3-(30 points)

Write and explain what you know about the following figures:

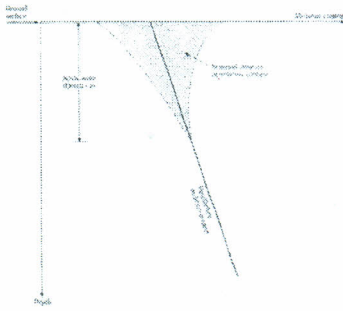


Figure (a)

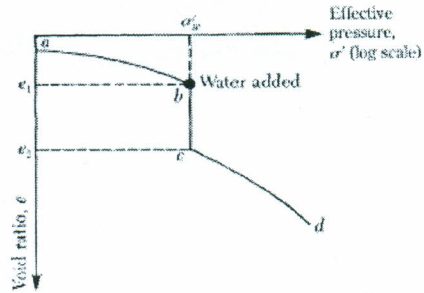


Figure (b)

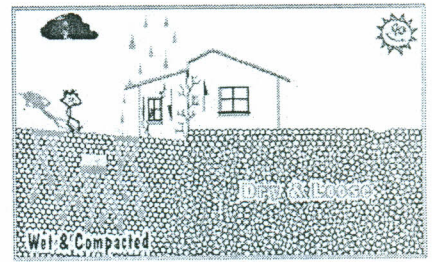


Figure (c)

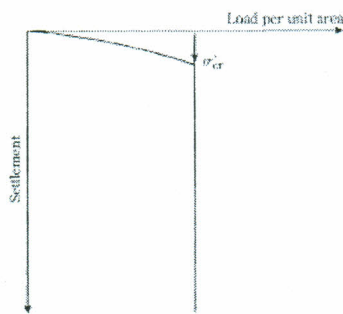


Figure (d)

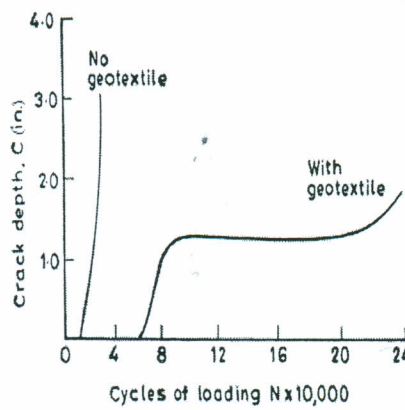


Figure (e)

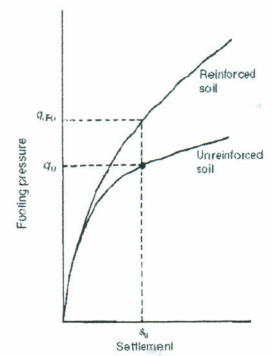


Figure (f)

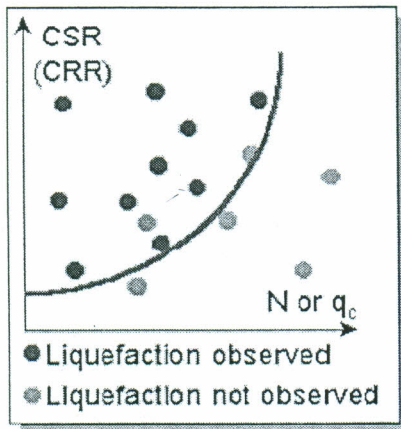


Figure (g)

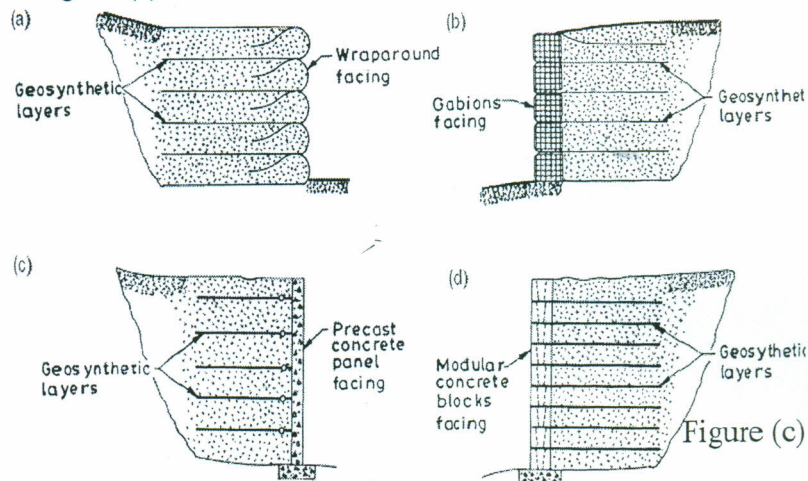


Figure (h)

Question No.4-(15 points)

Answer the following questions?

- a) When the soil layer is susceptible to wetting to a depth of about 10 m several techniques may be used to cause collapse of the soil before construction, mention some of these techniques?
- b) Mention and explain the Applications of Soil Reinforcement?
- c) What are the objectives of soil improvement?
- d) What are the objectives of Grouting?
- e) What are the advantages of compaction grouting?
- f) What are the stone column and its types?
- g) What are the vertical drains and its types?
- h) What is the soil mixing and its purposes?
- i) What is the dewatering? And its methods?
- j) What are the liquefaction failures types?

Question No.5-(15points)

A geotextile reinforced retaining wall 16 ft high is shown in Figure 1. . For the granular backfill, $\gamma_1 = 110 \text{ lb/ft}^3$ and $\phi_1 = 36^\circ$. For the geotextile, $\sigma_G = 80 \text{ lb/in}$. For the design of the wall, Determine S_v , L , and l_1 .

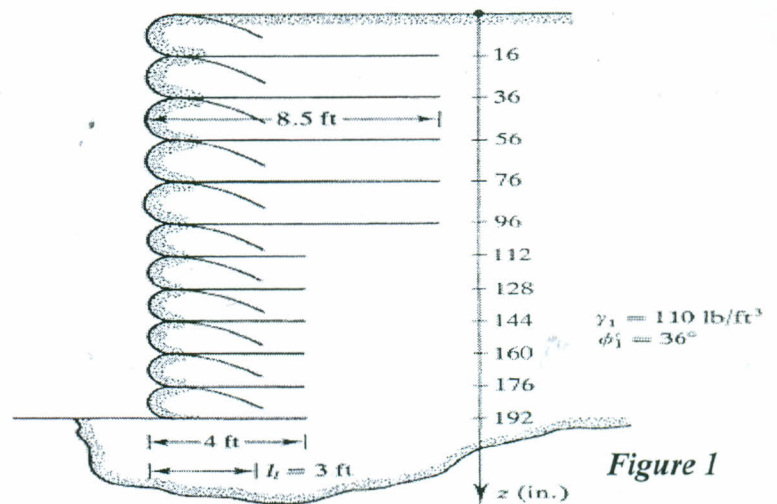


Figure 1

Question No.6-(10 points)

For the figure (2-a, b) shown, cracks and settlement have been happened and appeared after construction of the building, so explain the logic reasons for that problems. If the cracks and settlement were happened because of soil explain what are the percolations and considerations should be done for the soil before construction?

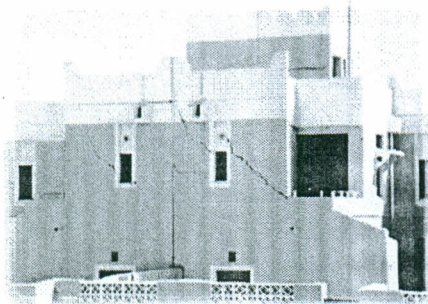


Figure 2-a



Figure 2-b

With our best wishes
Assist. Prof. Ayman Altharany
11/9/2013