

King Saud University
College of Engineering
Department of Civil Engineering

CE 381: Soil Mechanics I
1st Semester 1425-1426 H
Time allowed: 2 hours

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FINAL EXIMANATION

Question #	Mark
1	
2	
3	
4	
5	
Final (50)	

Mid-Term	
Final	
Total	

QUESTION # 1:

A sieve analysis on a soil sample indicates that 40% is retained on No. 60 sieve (0.25 mm opening), 60% retained on No. 100 sieve (0.15 mm opening), and 90% retained on No. 200 sieve (0.075 mm opening). The soil has a liquid limit of 65%, a plastic limit of 30% and a natural water content of 44%.

Without plotting the grain-size distribution curve:

Select the most accurate answer and **write it in the table below:**

1. The effective size

- (a) Can not be obtained
- (b) = 0.15 mm
- (c) = 0.075 mm
- (d) None of the above

4. The plasticity index

- (a) Can not be obtained
- (b) = 35 %
- (c) = 30 %
- (d) None of the above

2. The uniformity coefficient

- (a) Can not be obtained
- (b) = 3.33
- (c) = 1.67
- (d) None of the above

5. The liquidity index

- (a) Can not be obtained
- (b) = 0.65
- (c) = 0.45
- (d) None of the above

3. The coefficient of gradation

- (a) Can not be obtained
- (b) = 3.33
- (c) = 1.67
- (d) None of the above

1	2	3	4	5

QUESTION # 2:

A soil sample has a bulk unit weight of 19.62 kN/m^3 and a dry unit weight of 17.66 kN/m^3 . If the specific gravity of the soil is 2.70, compute:

- a) Void ratio
- b) Porosity
- c) Degree of saturation
- d) Saturated unit weight
- e) Relative density, if the maximum and the minimum void ratios of the soil are 0.85 and 0.45, respectively.

QUESTION # 3:

The results of a standard Proctor test is shown in the table below.

Moisture content (%)	Dry unit weight (kN/m^3)
6	14.8
8	17.45
9	18.52
11	18.9
12	18.5
14	16.9

The specifications for compaction states that the compacted field soil must be at least 95% of the maximum dry unit weight in the laboratory and within + 2% of the optimum moisture content.

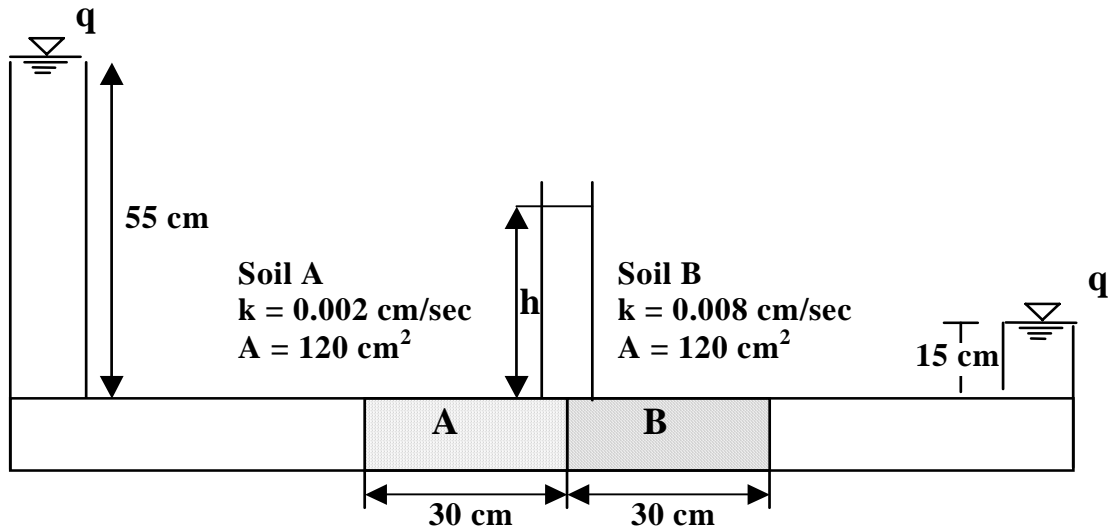
You dig a hole of 0.015 m^3 in the compacted layer and extract a sample that weighs 0.30 kN wet and 0.275 kN dry.

Does the sample meet the specifications?

QUESTION # 4:

For the data given on the figure below, determine:

- a) the head h .
- b) the discharge q .



QUESTION # 5:

The cross-section of a dam found on a sand stratum with a coefficient of permeability of 0.08 cm/sec is shown in the figure below. A flow net representing the seepage conditions is drawn. Determine:

- a) Uplift pressure at point A.
- b) Quantity of seepage under the dam in m^3/sec per meter length of the dam.