THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

BRIDGING TO HIGHER DIPLOMA (BHD 12)

EBC 2416: SOIL MECHANICS

END OF SEMESTER EXAMINATION
SERIES: AUGUST 2012
TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer Booklet*
- *Graph paper*
- *Plasticity chart*

- Particle size distribution chart

This paper consists of **FIVE** questions. Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (20 marks)

a) Explain the following terms:
   i) Liquid limit
   ii) Plastic limit
   iii) Shrinkage limit   **(4 ½ marks)**

b) The following results were obtained from a liquid limit test on a fine-grained soil.

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TABLE 1

Penetration (mm)	15.6	18.2	21.4	23.6
Moisture Content (%)	48.6	54.6	62.2	67.4

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A plastic limit test gave a value of 22%. What is the classification of this soil? Use the plasticity chart provided.   **(6 ½ marks)**

c) Outline the sieve analysis test.   **(6 marks)**

d) Define the following terms:
   i) Effective size
   ii) Uniformly coefficient   **(3 marks)**

Question Two (20 marks)

a) (i) Define the term moisture content.

   (ii) In a moisture content test for a certain soil, the following data was recorded (Table 2)

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TABLE 2

Mass of Empty Tin (g)	16.24	16.18
Tin + Wet Soil (g)	29.30	27.71
Tin + Dry Soil (g)	26.96	25.66

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Calculate the moisture content of the soil.   **(6 marks)**

b) Explain the **FOUR** main areas where soil mechanics is of great importance.   **(8 marks)**

c) Define the following terms: **(6 marks)**
   i) Void ratio
   ii) Porosity
   iii) Degree of saturation

Question Three (20 marks)

a) Briefly describe field determination of bulk density:

i) For undisturbed soil
ii) For disturbed soil condition. **(12 marks)**

b) A sample of soil weighing 30.6kg had a volume of 0.0183m³. When dried in an oven its weight reduced to 27.2kg. If the specific gravity of the soil solids was 2.65, determine the following:
   i) Bulk density
   ii) Dry density
   iii) Percentage moisture content
   iv) Percentage air voids **(8 marks)**

Question Four (20 marks)

a) State **FIVE** factors upon which properties of soils are dependent. **(7 ½ marks)**

b) The results of a sieve analysis on a soil sample are given in Table 3. If the total mass of sample was 311g, plot the particle size distribution curve on Chart 1. From the curve, describe the soil. **(12 ½ marks)**

<u>TABLE 3</u>

Sieve Size (mm)	Mass Retained (g)
50	0
37.5	15.5
20	17
14	10
10	11
6.3	33
3.35	114.5
1.18	63.3
0.6	18.2
0.15	17
0.063	10.5

Question Five (20 marks)

a) Outline the procedure for carrying out liquid limit using cone penetrometer method. **(10 marks)**
b) Explain the following terms: **(4 marks)**
   i) Fine-grained soils
   ii) Coarse-grained soils

c) Determine the saturation capacity of a soil given:
   - Bulk density = 1.96g/cc
   - Specific gravity of soil = 2.75
   - Moisture content = 16% **(6 marks)**