



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 13J)

EBC 2206: SOIL MECHANICS I

END OF SEMESTER EXAMINATION

SERIES: APRIL 2014

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Scientific Calculator*
- *Mathematical Table*

This paper consists of **FIVE** questions. Answer any **THREE** questions of the **FIVE** questions
 All questions carry equal marks
 Maximum marks for each part of a question are as shown
 This paper consists of **THREE** printed pages

Question One

- a) Distinguish the following:
 - (i) Granular soil from cohesive soil
 - (ii) Flocculation from dispersion **(7 marks)**

- b) Explain the significance of plastic limit and liquid limit in soil classification. **(3 marks)**

- c) A soil sample of mass 682.8g and moisture content 18% weighed 689.6g when coated with paraffin wax. Volume of the coated sample was found to be 345cm³ on immersion into water. Particle specific gravity for soil used and for the wax were 2.69 and 0.89 respectively. Use a soil model to determine:
 - (i) Bulk density
 - (ii) Void ratio
 - (iii) Degree of saturation
 - (iv) Moisture content if the soil were saturated **(10 marks)**

Question Two

- a) With the aid of a sketch explain the **THREE** consistency limits that apply to fine grained soils. **(7 marks)**

- b) (i) Describe the **TWO** soils represented in figure 1

- (ii) Suggest giving reason of the two soils in b(i) the one that would be suitable for road works. **(5 marks)**

- c) Particle size distribution results for a soil are as follows:

Particle size (mm)	3.35	2	1.1	0.6	0.42	0.3	0.21	0.1	0.063	0.0	0.00	0.002
Mass retained (g)	0	86	38	31	-	-	80	18.	14	13	8	5

- (i) Draw a grading curve using figure 2 provided.
- (ii) Describe the soil
- (iii) If liquid limit and plastic limit for a fine sample of the soil were 60% and 50% respectively. Use the results and the chart (Figure 3) to describe and classify the soil. **(3 marks)**

Question Three

- a) Outline objectives for soil compaction **(4 marks)**

- b) With the aid of a sketch explain specifications that can be used to control compaction of soils in the field. **(5 marks)**

- c) A soil sample from a coarse soil has a bulk density of 1750 kg/m^3 and moisture content of 18%. The sample weighed 1.5kg when oven dried and particle specific gravity for its solids is 2.68. Using soil model, determine:
- (i) Degree of saturation
 - (ii) Air voids ratio
- (11 marks)**

Question Four

- a) With the aid of a sketch, explain the following terms as applied to grading of soils:
- (i) Effective size
 - (ii) Coefficient of uniformity
- (4 marks)**
- b) Briefly explain factors that affect soil compaction. **(5 marks)**
- c) The following results were obtained from a standard compaction test carried out on a soil of particle specific gravity 2.68.

Sample number	1	2	3	4	5	6
Moisture content (%)	11.3	12.2	13.0	14.2	15.1	16.6
Bulk Density (mg/m^3)	1.98	2.09	2.17	2.20	2.19	2.15

- (i) Compute for each test data for drawing compaction curve
- (ii) Draw the compaction graph
- (iii) Determine compaction parameters
- (iv) Find the air void ratio at the compaction parameters obtained in (c)(iii)

(8 marks)

Question Five

- a) Outline FOUR factors that affect permeability of soils. **(8 marks)**
- b) Outline the method used to determine coefficient of permeability for granular soils in the laboratory. **(12 marks)**