THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING 09A
DIPLOMA IN CIVIL AND CAD 09A

EBC 2302: SOIL MECHANICS II

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination

- *Answer booklet*
- *Scientific Calculator*
- *Drawing instruments*

This paper consists of **FIVE** questions
Answer question **ONE** and any other **TWO** questions
Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

a) Briefly explain the reason for the following types of site investigation surveys

(i) Reconnaissance survey
(ii) Preliminary survey
(iii) Detailed survey (9 marks)

b) For a railway track 6.0m high embankment was required. The day to be used had a cohesion equal to 19.62 KN/m^3 and unit weight of 18.84 KN/m^3. Calculate the permissible slope angle for embankment if a hard rocky stratum was found 3.0m below the ground level. Assume ϕ for clay = 0. Given. For depth factor D_f = 1.5, values of N and $\propto$ are:

N	$\propto$
0.181	53°
0.174	45°
0.164	30°

(12marks)

c) Explain the following boring methods

(i) Wash boring
(ii) Percussion boring
(iii) Rotary boring (9 marks)

SECTION B (Answer *any TWO questions from this section*)

Question 2

a) With the aid of sketches, illustrate the following
(i) Face failure
(ii) Toe failure
(iii) Base failure (6 marks)

b) A cutting is to be made in a soil mass having γ = 1.8t/m^3, C = 1.6t/m^2 and ϕ = 15; with slide slopes of 30° to the horizontal, up to a depth of 12m below the ground level. Determine the factor of safety of the slope against shear failure. Assume the friction and cohesion are mobilized to the same proportion of their ultimate values. Given that value of Taylor's stability Number S_n= 0.046 (14 marks)

Question 3

a) The observed standard penetration test value in a deposit of fully submerged sand was 45 at a depth of 6.5m. The average effective unit weight of the soil is 9.69KN/m^3. The other data given are (a) hammer efficiency = 0.8 (b) drill rod length correction factor = 0.9, and (c) borehole correction factor 1.05. Determine the corrected SPT value for standard energy when:

(i) R_{es} = 60%
(ii) R_{es} = 70% (14 marks)

b) Briefly explain the items to be contained in a site investigation report (6 marks)

Question 4

a) Briefly describe **THREE** causes of soil erosion (6 marks)

b) The table below gives the data used in the construction of an embankment.

	Density Mg/m^3	Water content %
Soil from borrow pit	1.75	12
Soil after compaction	2.0	18

For every 100m^3 of compacted soil of the embankment, estimate:

(i) The quantity of soil to be excavated from the borrow pit

(ii) The amount of water to be added (14 marks)

Question 5

a) Explain the following types of laboratory shear tests for soils

(i) Unconsolidated - undrained tests
(ii) Consolidated - undrained tests
(iii) Consolidated-drained slow tests (6 marks)

b) An embankment is being constructed of soil whose properties are C = 51KN/m^3, ϕ = 21° and γ = 15.7KN/m^3. The pore pressure parameters as determined from triaxial tests are A = 0.5, and B = 0.9. Find the shear strength of the soil at the base of the embankment just after the height of fill has been raised from 3m to 6m. Assume that the dissipation of pore pressure during this stage of construction is negligible and that the lateral pressure at any point is ½ if the vertical pressure. (14 marks)