THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

Institutional Based Program

UNIVERSITY EXAMINATION FOR BACHELOR OF ENGINEERING IN BUILDING & CIVIL ENGINEERING

EBC 4302: SOIL MECHANICS II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2012
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions in **TWO** sections **I** & **II**
Answer question **ONE (Compulsory)** and any other **TWO** questions
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

SECTION I (Compulsory)

Question 1

a) Using illustrations, briefly discuss the different types of slope failure (8 marks)

b) Outline the **THREE** principle objectives of ground investigation (6 marks)

c) Briefly discuss the following methods of ground investigation.
   (i) Trial pits (3 marks)
   (ii) Percussion boring/drilling (5 marks)
   (iii) Hand and portable angers (3 marks)

d) A long natural slope in overconsolidated fissured clay of saturated unit weight 20KN/m^3 is inclined at 12^o to the horizontal. The water table is at the surface and seepage is roughly parallel to the slope. A slip has developed on a plane parallel to the surface at a depth of 5m. Determine the factor of safety along the slip plane using:

$$\phi'_{cv} = 28^o$$

(i) The critical-state parameter

$$\phi'_r = 20^o \qquad = 10.2KN/m^3$$

(ii) The residual strength parameter , (5 marks)

SECTION II (Answer any TWO questions)

Question 2

a) Define soil stabilization and highlight the various types of admixtures used in soil stabilization (10 marks)

b) Discuss the following methods/types of soil stabilization.

(i) Cement stabilization (2 marks)
(ii) Mechanical stabilization (6 marks)
(iii) Bituminous stabilization (2 marks)

Question 3

a) A 45^o slope is excavated to a depth of 8m in a deep layer of saturated clay of unit weight $\phi_u = 0$ 19KN/m^3, the relevant shear strength parameters are Cu = 65KN/m^2 and . Determine the factor of safety for the trial surface specified in the figure below. Check that no loss of overall stability will occur according to the limit state approach. Cross-sectional area ABCD = 70m^2. Ns = 0.18. Arc Length ABC = 18.9m. Partial factor = 1.40.

FIGURE 1

b) Briefly discuss the soil stabilization method by injection of suitable grouts (10 marks)

Question 4

a) Define shear strength of a soil (2 marks)

b) Briefly discuss stability analysis and shearing strength characteristics of soils (5 marks)

c) Outline the basic relationships of Mohr's stress circle (5 marks)

d) Briefly discuss borehole logs and their application in ground investigation (8 marks)

Question 5

Write short notes on the following geotechnical materials

(i) Landfill liners (4 marks)
(ii) Geonets (2 marks)
(iii) Geosynthetics (4 marks)
(iv) Geotextiles (6 marks)
(v) Geomembranes (4 marks)