THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING

EBC 3302: SOIL MECHANICS II

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

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*
- *Charts 11.9 & 11.7*

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) Name and explain the **FIVE** factors that control the rate and magnitude of soil erosion by wind. **(13 marks)**

b) State **SEVEN** factors that influence soil erodibility **(7 marks)**

Question Two (20 marks)

a) With the aid of a sketch, describe flows type of slope failure. **(5 marks)**

b) A cutting in saturated clay is inclined at a slope of 1 vertical: 1:5 horizontal and has a vertical height of 8m. The bulk unit weight of the soil is 19.0KN/m^3 and its undrained cohesion is 38KN/m^2 $(\phi_u = 0)$
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Determine the factors of safety against immediate shear failure along the slip circle shown in figure 1.

i) Ignoring the tension crack
ii) Allowing for the tension crack empty of water, and;
iii) Allowing for the tension crack when full of water. **(15 marks)**

$\theta = 85^o$

Take: Sector angle,

Area of slip mass = 78m2

d = 5.1

$\theta_c = 67^o$

And Sector angle

Area of slip mass = 72m2

d = 4.8m

Question Three (20 marks)

a) Outline the following stages of site investigation:
   i) Preliminary investigation
   ii) General site survey and Examination
   iii) Detailed site exploration and sampling. **(11 marks)**

b) A square foundation 3.6m side is to be founded at a depth of 1.5m in medium sand (γ = 19.8KN/m^3). The water table is located at a depth of 3.6m. During site investigations, a standard penetration test provided the following values:

Depth (M)	1.4	2.2	3.0	3.8	4.6	5.4
N Value	7	9	12	12	17	20

Determine the estimate for the allowable bearing capacity based on a maximum settlement of 25mm. **(9 marks)**

Question Four (20 marks)

a) With the aid of a sketch, describe the thin-walled sampler used in site investigation. **(8 marks)**

b) (i) Differentiate between instability and failure in respect to stability of slopes.
   (ii) State the **TWO** factors that provide resistance to failure of slopes. **(4 marks)**

c) Briefly explain Sheet and Rill erosion. **(8 marks)**

Question Five (20 marks)

a) The bank of a canal has the profile shown in figure 2. The material is homogeneous clay of density 2000kg/m^3, cohesion 30KN/m^2 and angle of shearing resistance zero. For the slip circle shown, the area of ABCDE is 165m^2, and the centroid is at G. Find for each of the following conditions the factor of safety for this slip circle

i) If the water in the canal is level with the top of the bank, and;
ii) If the canal is empty.

In both cases, allow for a tension crack 3m deep which may be filled with water. **(15 marks)**

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b) State **FIVE** objectives of site investigation. **(5 marks)**