



# Machakos University College

(A Constituent College of Kenyatta University)

University Examinations 2013/2014

SCHOOL OF ENGINEERING

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

## Diploma in Building Technology Module II Diploma in Civil Engineering Module II

Structures II, Geotechnology II and Concrete Technology II

Date: 20/3/2014

Time: 8:30 – 11:30

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### *Instructions to Candidates*

- (i) Answer any five questions
- (ii) All questions carry equal marks.

### **SECTION A**

**Answer at least two questions from this section**

1. A Masonry retaining wall supports a cohesionless soil sold having a unit weight of  $18.5\text{KN/M}^3$  and an angle of shearing resistance of  $30^\circ$

The unit weight of the wall is  $24\text{KN/M}^3$  and a surcharge load of  $40\text{KN/M}^2$  is applied to the surface of the soil as shown in the figure 1.

- (a) Examine the stability of the wall with respect of overturning, sliding and tension in the joints
- (b) Calculate the maximum and minimum ground bearing pressure occurring beneath the base of the wall. (20 marks)

2. A steel column section carries three loads as shown in figure 2.  
Calculate the stresses at the four extreme corners of the column. (20 marks)
3. (a) Derive expressions for the slope and deflection occurring at the free end of a cantilever carrying a point load as shown in figure 3. Using Macaulay's method. (10 marks)
- (b) Using Mohr's theorems, calculate the deflection and rotation at the free end of the cantilever shown in figure 4 (10 marks)
4. A reservoir, 4m high retains water as shown in figure 5. Calculate the maximum and minimum stresses at the base of the tank when:
- (a) The tank is full  
(b) The tank is empty
- Density of masonry =  $20\text{KN/M}^3$   
Density of water =  $10\text{KN/M}^3$

## **SECTION B**

### **GEOTECHNOLOGY II**

**Answer at least One question from this section**

5. (a) Define the following terms as refer to in faulting. (5 marks)
- (i) Fault gauge
  - (ii) Fault plane
  - (iii) Fault creep
  - (iv) Fault trace
  - (v) Hade angle
- (b) Explain the following physical process of weathering
- (i) Abrasion
  - (ii) Thermal stress
  - (iii) Frost action
  - (iv) Pressure release
  - (v) Hydraulic action
- (6 marks)
- (c) Explain six geological effects of faulting above and underneath the surface of the earth
- (9 marks)
6. (a) Using elaborate sketches, describe the formation of the following
- (i) Graben
  - (ii) Horst
- (4 marks)
- (b) Explain two effects of weathering on rocks in each case under the following sub-headings;
- (i) Mechanical effects
  - (ii) Chemical effects
  - (iii) Biological effects.
- (6 marks)

## **SECTION C: CONCRETE TECHNOLOGY II**

**ANSWER AT LEAST ONE QUESTION FROM THIS SECTION**

7. (a) Outline THREE main stages in the production of a concrete structure. (6 marks)
- (b) State FIVE factors to consider when selection the concreting plant to use. (10 marks)
- (c) State TWO advantages of ready mixed concrete. (4 marks)
8. (a) Make neat sketches of the following concrete mixing plants:-

- (i) Tilting drum mixer
  - (ii) Paddle mixer
- (b) Outline FIVE factors to consider when selecting a suitable concreting plant.

(10 marks)

(10 marks)