



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2014/2015

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

2705/202:

2707/202: STRUCTURES II, GEOTECHNOLOGY AND CONCRETE
TECHNOLOGY II

DATE: 18/04/2015

TIME: 8:30-11:30 AM

Instructions

- *This paper consists of Eight questions in Three sections A,B and C*
- *Answer Five questions choosing Two questions from Section A, two questions from Section B and One question from section C*
- *All questions carry equal marks*

SECTION A: STRUCTURES II

Answer **Two** questions from this section

1. Figure 1 shows a simply supported beam carrying a concentrated load at mid span.
 - a) Using Macaulay's method determine the maximum deflection
 - b) Using Mohr's theorems determine the slope and deflection at the quarter span point marked C(20 marks)

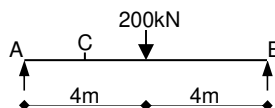


Fig. 1

2. A column carries a load P , of 200kN at an eccentricity of 30mm to both principle axes as shown in figure 2.
- Calculate the stresses at each of the four corners of the section
 - If no tensile stresses are allowed to develop in the section, determine the maximum eccentricity of the load from the X-X axis if the eccentricity from the Y-Y axis is maintained at 30mm.
- (20 marks)

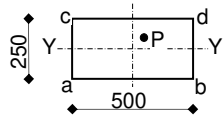


Fig. 2

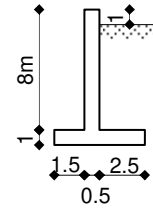


Fig. 3

3. A reinforced concrete retaining wall, as shown in figure 3, supports a cohesionless soil having a unit weight of 18kN/m^3 and an angle of shearing resistance of 32° . Determine:
- The maximum and minimum ground bearing pressures
 - The factor of safety against overturning
 - The factor of safety against sliding if the coefficient of friction is 0.4
- Unit weight of concrete = 24kN/m^3
- (20 marks)

SECTION B: GEOTECHNOLOGY

Answer **Two** questions from this section

4. (a) Define the term “weathering” as applies to rocks. (2 marks)
- (b) Describe the following term as applies to mechanical weathering
- Abrasion
 - Thermo fatigue
 - Thermo stress
 - Frost
 - Pressure
- (10 marks)
- (c) Describe the processes involved in “chemical” as a method of weathering
- Carbonation
 - Hydration
 - Hydrolysis

- (iv) Oxidation. (8 marks)
5. (a) Define the term “Fault” as it applies to Rocks. (2 marks)
- (b) By use of a diagram describe the meaning of the following terms
- (i) Fault plane
 - (ii) Fault gouge
 - (iii) Fault creep
 - (v) Fault scarp (8 marks)
- (c) Describe any five geological effects (significance) of faults. (10 marks)
6. (a) Define the term “fold” as its applies in geo-technology. (2 marks)
- (b) Explain the meaning of the following terms in relation to folding
- (i) Limbs
 - (ii) Trough
 - (iii) Hinge point
 - (iv) Crest (8 marks)
- (c) (i) Briefly describe three types of folds. (6 marks)
- (ii) Outline two geological significance of folds. (4 marks)

SECTION C: CONCRETE TECHNOLOGY II

*Answer **One** question from this section*

7. (a) List five methods of transporting concrete. (5 marks)
- (b) Explain Ten factors that influence the quality of concrete. (5 marks)
- (c) Explain the methods used to cure concrete in the following weather conditions
- (i) Hot weather
 - (ii) Cold weather (10 marks)
8. (a) Outline Five advantages and disadvantages of using precast concrete products. (5 marks)
- (b) List Five types of additives and admixtures in concrete stating their functions. (5 marks)
- (c) Using sketched describe the following types of joints in concrete
- (i) Expansion and contraction joint
 - (ii) Construction joint (10 marks)