



KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2019/2020
FIRST SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE (CONSTRUCTION MANAGEMENT)
BCM 207: SOIL MECHANICS & FOUNDATIONS

DATE: Tuesday, 10th December 2019

TIME: 2.00 p.m. - 4.00 p.m.

INSTRUCTIONS:

Answer question ONE and ANY OTHER TWO questions from Section Two.

QUESTION 1

- a) Define the following terms:
 - i. Soil mechanics and
 - ii. Foundation engineering (3 marks)
- b) State the FOUR main components of soils. (2 marks)
- c) Outline FOUR desirable requirements for a satisfactory engineering soil classification system. (4 marks)
- d) Explain the FIVE soil forming factors. (7.5 marks)
- e) Explain the THREE Atterberg limits of consistency with the aid of a well labeled graph. (5 marks)
- f) Discuss the following
 - i. Residual soils
 - ii. Colluvial soils (3 marks)
- g) With the aid of phase diagram of soil mass, express degree of saturation (S_r) in terms of water content, specific gravity and void ratio. (3 marks)
- h) Discuss cohesion as an engineering property of soil. (2.5 marks)

SECTION 2: ANSWER ANY TWO QUESTIONS (40 MARKS)

QUESTION 2 (20 MARKS)

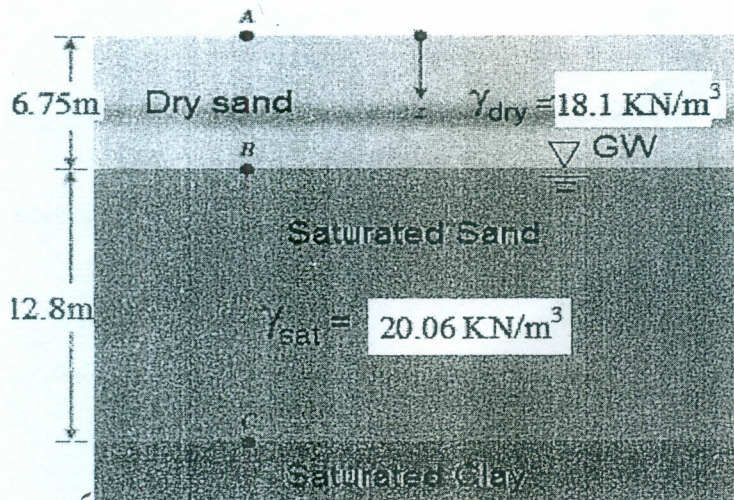
- a) Explain the THREE important aspects of soil explorations. (3 marks)
- b) With the aid of sketches, explain how a trial pit differs from hand augered holes. (3 marks)
- c) Outline the TWO differences between compaction and consolidation. (2 marks)

INVOLVEMENT IN ANY EXAMINATION IRREGULARITY SHALL LEAD TO DISCONTINUATION

- d) Explain the active earth pressure and passive earth pressure using clearly labeled sketches. (5 marks)
- e) Discuss the three types of soil water. (3 marks)
- f) Explain any FOUR causes of movements of foundations which lead to settlements. (4 marks)

QUESTION 3 (20 MARKS)

- a) Explain the following terminology as related to foundations.
- Backfill
 - Bearing capacity (3 marks)
- b) Outline FOUR disadvantages of strip foundations in sloping building sites. (3 marks)
- c) Discuss TWO solutions to minimize the issues in (b) above. (4 marks)
- d) For the soil profile calculate the vertical total, effective stresses and pore water pressure at points (A), (B) and (C).



- e) With the aid of sketches discuss the cantilever needle beam method of underpinning. (5 marks)

QUESTION 4 (20 MARKS)

- a) State and explain the TWO main classes of foundations. (3 marks)
- b) Discuss and sketch a typical form of pad footing. (4 marks)
- c) Outline the THREE reasons that justify the choice and design of pile foundations. (3 marks)
- d) Outline any TWO situations where combined footings are utilized in building construction. (4 marks)

- e) Discuss any TWO factors that affect the choice and design of foundations for buildings. (3 marks)
- f) With the aid of a well labeled sketch, show a Mass Retaining wall and the various stresses on it. (3 marks)

QUESTION 5 (20 MARKS)

- a) Explain the term consolidation and outline FOUR factors that cause consolidation of soils. (5 marks)
- b) Outline any FOUR functions of retaining walls. (4 marks)
- c) Discuss significance of
- i. Shear tests
 - ii. Consolidation tests
- (3 marks)
- d) Outline THREE structural reasons which would require underpinning methods to stabilize the foundation. (3 marks)
- e) With an aid of a sketch discuss the raft foundations and their application. (3 marks)
- f) Outline the mechanism by which molasses stabilize soils. (2 marks)