



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2508 : GEOTECHNICAL ENGINEERING

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE (COMPULSORY) (30 Marks)

- a) Define Geotechnical engineering and highlight its role in Civil engineering. (2marks)
- b) Briefly describe **four (4)** types of compaction equipment. (8marks)
- c) Outline the **three (3)** phases of site investigation prior to the design of foundation works. (6marks)
- d) Discuss soil phases. (5marks)
- e) A moist sample of soil has a volume of 464cm^3 in its natural state and weighs 793g. The dry weight is 735g. and has a specific gravity of 2.68. Determine;
 - i) Void ratio
 - ii) Porosity
 - iii) Water content
 - iv) Degree of saturation. (4marks)



ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a) Using illustrations, discuss deformations of interest in embankment settlement. (10marks)
- b) A soil sample in its natural state has a mass of 2.305kg. and a volume of $1.15 \times 10^{-3} \text{ m}^3$. Under oven dried state, the dry mass of the sample is 2.105kg. The specific gravity is 2.68. Determine the following;
 - i) Total density
 - ii) Water content
 - iii) Porosity
 - iv) Degree of saturation
 - v) Void ratio (10marks)

QUESTION THREE (20 Marks)

- a) Outline three field tests commonly used in sub-surface soil investigation. (6marks)
- b) Briefly discuss **four (4)** types of geosynthetics including their functions. (14marks)

QUESTION FOUR (20 Marks)

- a) Outline the factors affecting the choice of a dam site. (14marks)
- b) What are the factors that determine “tunnel stand-up time”? (6marks)

QUESTION FIVE (20 Marks)

- a) Define Geosynthetics. (3marks)
- b) Define a Tunnel. (2marks)
- c) Briefly discuss the following types of dams;
 - i) Diaphragm dam
 - ii) Homogeneous dam (15marks).