MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ENGINEERING TECHNOLOGY

UNIVERSITY ORDINARY EXAMINATION

2020/2021 ACADEMIC YEAR

SECOND YEAR **FIRST** SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

SEB 1232–SOIL MECHANICS I

DURATION:2 HOURS

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Define the following terms: (8marks)
   i. Porosity
   ii. Degree of saturation
   iii. Voice ratio\specific gravity

b) A sample of soil weighing 30kg had a volume of 0.0162 m^3.when dried out in oven its weight was reduced to 27.4kg.The specific gravity of the solid was found to be 2.65.Determine
   i. Bulk density (2marks)
   ii. Dry density (2marks)
   iii. Moisture content (2marks)
   iv. Void ratio (2marks)
   v. Porosity (2marks)

c) Differentiate between residual soil and transported soil (4marks)

d) State the transportation agency for each of the following soil deposits
   i. Alluvial deposits
   ii. Lacustrine deposits
   iii. marine deposits
   iv. Aeolian deposits
   v. Glacial deposits (5marks)

e) Describe one method to determine the distribution of grain sizes presents in a given soil sample. (3marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) Explain the following terms: (8marks)
   i. Liquid limit
   ii. Plastic limit
   iii. Shrinkage limit
   iv. Plasticity index

b) A saturated sample of soil has a moisture content of 30% .If the specific gravity is 2.65.Calculate ,
   i. The void ratio (3marks)
   ii. Porosity (3marks)
   iii. Bulk density (2marks)
   iv. Saturated unit mass (2marks)
   v. Dry unit mass (2marks)

QUESTION THREE (20 MARKS)

a) Outline four engineering properties improved by compaction (4marks)

b) In order to determine, the density of clay soil an undisturbed sample was taken in a sampling tube whose volume was 1.6×10^{-3} .The following data were recorded.

Mass of tube empty 2.86kg

Mass of tube + clay sample 10kg

Mass of tube + clay sample after oven dry 6.31kg.

Calculate

i. Water content (3marks)
ii. Dry density (3marks)
iii. Bulk density (4marks)
iv. If the specific gravity of the soil particles was 2.69,find degree of saturation of the clay (6marks)

QUESTION FOUR (20 MARKS)

a) The following results were obtained following a test on a sample of soil

Liquid unit 50%

Plastic limit 32%

Moisture content 28%

Specific gravity of particle 2.65

Degree of saturation 1.00

Determine:

i. The void ratio (2marks)
ii. Porosity (2marks)
iii. Bulk density (3marks)
iv. Dry density (3marks)
v. Plasticity index (2marks)

b) Explain the following types of rocks (6marks)
   i. Sedimentary rocks
   ii. Metamorphic rocks
   iii. Igneous rocks

c) Differentiate between compaction and consolidation (2marks)