MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIRST YEAR TERM I EXAMINATION FOR

DIPLOMA IN BUILDING TECHNOLOGY AND CIVIL ENGINEERING

GEOTECHNOLOGY 1

DATE: 8/6/2021   **TIME: 2:30 – 5:30 PM**

INSTRUCTIONS

ANSWER ALL QUESTIONS

1. a)   Define the term soil according to engineering   (2 marks)

    b)   Describe the formation of the following soil types

         i)   Residual soil
         ii)   Organic soil

         iii)   Transported soil   (10 marks)

    c)   With the aid of a diagram, describe the three basic structural units of clay
                                                                          (8 marks)

2. a)   With the aid a diagram, describe three types of soil structure   (10 marks)

    b)   Describe five tests done during field classification of soil   (10marks)

3. a)   Define the following soil properties

         i)   Void ratio
         ii)   Porosity
         iii)   Moisture content
         iv)   Specific gravity
         v)   Degree of Saturation
         vi)   Dry density   (12 marks)

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b)   In its natural condition, a soil sample has a mass of 2290g and a volume of $1.15 \times 10^{-3} M^3$. After being completely dried in an oven the mass of the sample is 2035g. The value of specific gravity (Gs) for the soil is 2.68. Determine:

    i)   Bulk density
    ii)   Unit weight
    iii)   Water content
    iv)   Void ratio
    v)   Degree of saturation
    vi)   Air content   (8 marks)

4.   Define the following terms

    i)   Liquid limit
    ii)   Plastic limit
    iii)   Shrinkage limit
    iv)   Plasticity index
    v)   Liquidity index
    vi)   Flow index   (12 marks)

    b)   Explain the dry sieving procedure used during particle sieve analysis of soil

                                                                                                                    (8 marks)

5.   a)   Give two reasons for soil classification   (4 marks)

    b)   With the a diagram, describe the three soil constituents types   (8 marks)

    c)   Explain the two types of soil weathering   (6 marks)

    d)   Give three groups used in grain size classification   (2 marks)