(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

(Main Campus)

UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

Examination

SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE OF

BACHELOR OF SCIENCE IN DISASTER PREPAREDNESS & ENVIRONMENTAL TECHNOLOGY

COURSE CODE: **DPE 206**

COURSE TITLE: **SOIL MECHANICS**

DATE: 13/4/2023 TIME: 8-10 AM

Instructions to Candidates

- This paper contains FOUR (4) questions
- Question **one is compulsory** {**total =30 Marks**}
- Attempt **any other two** (2) {total = **40 Marks**} from the remaining questions
- Be brief and to the point

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over →

SECTION 1: COMPULSORY {30 MARKS}

Question ONE

a) Briefly explain field application of soil mechanics [5 Marks]

b) With the aid of a diagram, explain the settlement of a shallow foundation and the methods used in routine design [4 Marks]

c) Briefly describe the importance of Non-linear soil stiffness in routine design [2 Marks]

d) Describe the major components of the soil [4 Marks]

e) Discuss the objectives of soil mechanics study [3 marks]

f) Discuss why soil buffering action is important in agriculture [2 Marks]

g) Briefly describe textural classification systems of the soil [3 Marks]

h) Briefly describe the importance of soil compaction in engineering works [3 Marks]

i) With the aid of a diagram, briefly discuss the curve stress-strain relationship in low-carbon steel [4 Marks]

SECTION II: ATTEMPT ANY OTHER TWO (2) QUESTIONS {40 MARKS}

Question TWO

a) With the aid of sketches, describe the characteristics of non-linearity property in soil samples [13 Marks]

b) Discuss the properties of soil colloids [7 marks]

Question THREE

a) Briefly describe determination of Coefficient of Consolidation [CC] using Casagrande Logarithm of Time Fitting Method [10 Marks]

b) A cube of soil measures 10 cm x 10 cm x 10 cm and depth =10 cm and has a total wet weight of 1460 g including 260 g of water. Assuming the particle density of 2.65 Mg m^{-3}. Determine the following:

i) The water content on mass and volume basis [1 Mark]

ii) Bulk density [1 Mark]

iii) Porosity [1 Mark]

iv) Water holding capacity [1 Marks]

v) Air-filled porosity [2 Marks]

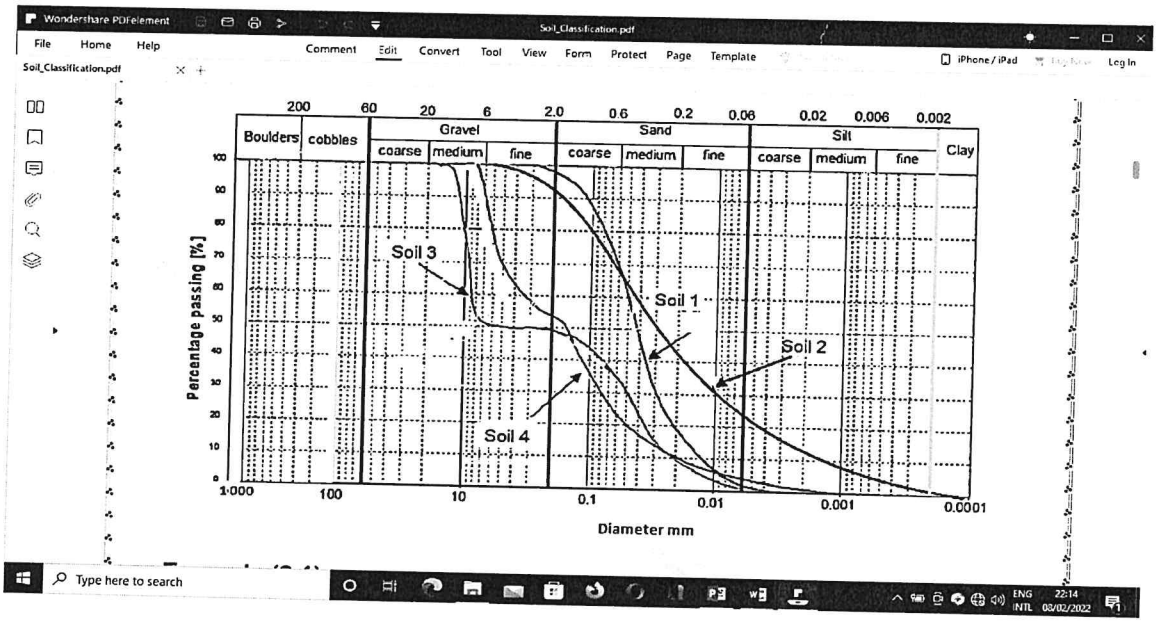
vi) Degree of saturation [2 Marks]

vii) Depth of soil water [2 Marks]

Question FOUR

a) Classify soils 1 – 4 shown in the figure below according to MIT soil classification system

Marks]



b) Use a sketch for volume and mass relationships in soils to derive the relevant basic equations [10 Marks]

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