



**MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
(MMUST)**

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

SPECIAL/SUPPLEMENTARY FIRST YEAR EXAMINATIONS

FOR THE DEGREES OF

**BACHELOR OF SCIENCE IN AGRICULTURE AND BIOTECHNOLOGY
BACHELOR OF SCIENCE IN AGRICULTURAL ECONOMICS AND RESOURCE
MANAGEMENT
BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION
BACHELOR OF SCIENCE IN ANIMAL PRODUCTION
BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT AND MARKETING
BACHELOR OF SCIENCE IN FISHERIES AND AQUACULTURE TECHNOLOGY**

COURSE CODE: ASS 101/ASS111

COURSE TITLE: INTRODUCTION TO SOIL SCIENCE

DATE: 29.8.22

TIME: 11-1PM

INSTRUCTIONS

- Answer ALL Questions
- Marks per question/section shown in brackets.

Question One

- a) Outline the key tasks that soil performs making it essential for the survival of mankind (5 marks)
- b) Explain the basic sources of current knowledge about the study of soil science. (2 marks)
- c) State and explain the 'Law of the minimum' as used in soil science. (3 marks)
- d) Show by illustration the spheres and components that constitute the pedosphere. (5 marks)
- e) Explain with the help of an illustration the definition of soil based on agricultural point of view. (5 marks)

Question Two

- a) Explain the term soil profile and give an illustration that shows clearly the various terms used for different layers. (5 marks)
- b) Differentiate between humus, humin, fulvic acids and humic acids in soil (5 marks)
- c) Discuss the importance of organic matter in soil (10 marks)

Question Three

- a) Silicate minerals in soil are made of the silicate tetrahedral as the 'building block' of their structures.
- i) Draw the silicate tetrahedral and indicate its net charge. (2 marks)
- ii) Explain how the net charge is neutralized (4 marks)
- iii) List the different types of silicate mineral structures that result from the neutralization of the charge. (4 marks)
- b) Draw the structures of 1:1, 2:1, 2:1:1 clay minerals (1 ½ marks)
- c) Give a mineral example of each structure in question b) above (1 ½ marks)
- d) Explain c-spacing with regard to soil minerals and why it may be fixed in Kaolinite and Mica but variable in Smectite when water is added to soil. (4 marks)
- e) What soil conditions are corrected by the following:
- i) Dolomite (1 mark)
- ii) Gypsum (1 mark)
- iii) Apatite (1 mark)

Question Four

Distinguish between the following:

- a) Soil structure and soil texture (2 marks)
- b) Cation exchange capacity (CEC) and percent base saturation (PBS) (2 marks)
- c) Permanent and pH dependent charges (2 marks)
- d) Macronutrients and micronutrient (2 marks)
- e) Mineralization and mobilization (2 marks)