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ASS 206



University of Choice

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

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR
MAIN EXAMINATION**

SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE OF

**BACHELOR OF SCIENCE IN AGRICULTURE AND
BIOTECHNOLOGY**

COURSE CODE: ASS 206

**COURSE TITLE: SOIL SURVEY, MORPHOLOGY AND
CLASSIFICATION**

DATE: 13.04.2023

TIME: 12- 2PM

INSTRUCTIONS

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

QUESTION ONE: 30 MARKS

Q1. (a) Define the following:

- (i) Soil survey (1 mark)
- (ii) Taxonomic unit (1 mark)
- (iii) Soil phases (1 mark)

(b) What information do you gather and study in the office before undertaking a soil survey? (3 marks)

(c) Name the five types of soil surveys used in Kenya with respect to scales and purposes (10 marks)

Q2. (a) With respect to soil oxido-reduction processes of weathering:

- (i) List the conditions necessary for the processes
- (ii) Explain the processes
- (iii) List the resulting macro-morphological features in the profile (7 marks)

(b) What soil macro morphological features are observed in a profile horizon as a result of the following:

- (i) Biological activity process (3 marks)
- (ii) Swelling and shrinking processes (3 marks)

(c) Give the soil forming processes associated with the soil morphological features below:

- (i) Cutans (1 mark)
- (ii) Bleaching (1 mark)
- (iii) Brown to dark brown coating of soil peds (1 mark)

Q3. (a) Differentiate between the following giving an example of each:

- i) Master horizons and diagnostic horizons of soils (3 marks)
- ii) Epipedons and endopedons (3 marks)

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(b) Give the requirements for the characteristics used to differentiate the horizons shown in the table below.

| Characteristic | Requirements | | |
|---|--------------|----------|----------|
| | Mollic A | Ochric A | Umbric A |
| Soil structure | | | |
| Soil Color | | | |
| Base saturation | | | |
| Organic carbon | | | |
| Horizon thickness | | | |
| P ₂ O ₅ soluble in 1% citric acid | | | |

(8 marks)

Q4. (a) What designations of master horizons (H, O, A, B, E, or C together with the letter suffixes qualifying the departure from parent material e.g. Bg where necessary) would represent the following descriptions: (10 marks)

- (i) The horizon shows a concentration of sand and silt fractions high in resistant minerals.
- (ii) The horizon shows illuvial concentration of silicate clay, iron, aluminium, or humus alone or in combinations.
- (iii) The horizon shows an accumulation of humified organic matter intimately associated with the mineral fraction.
- (iv) The horizon results from a loss of silicate clay, iron or aluminium or some combination of them.
- (v) The horizon has a morphology acquired by soil formation but lacks the properties of B-horizon.
- (vi) The horizon contains 20 % or more organic carbon that is generally poorly decomposed and occurs under naturally well drained conditions.
- (vii) The horizon is usually eluvial and underlies another from which it is differentiated by a lower content of organic matter and a lighter colour.
- (viii) The horizon consists of unconsolidated material from which the solum is presumed to have formed.
- (ix) The horizon shows a residual concentration of sesquioxides relative to source materials.
- (x) The horizon shows an alteration of material from its original condition to the extent that silicate clays are formed, oxides are liberated, or both, or granular, blocky, or prismatic structure is formed.

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Q5. Indicate the factor of soil formation that condition the development of the following soil groups:

- | | | | |
|--------------------|-----------------|----------------|-----------------|
| (i) Vertisols | (ii) Cambisols | (iii) Gleysols | (iv) Anthrosols |
| (v) Arenosols | (vi) Ferralsols | (vii) Acrisols | (viii) Andosols |
| (ix) Leptosols | (x) Luvisols | (xi) Histosols | (xii) Phaeozems |
| (xiii) Plinthosols | (xiv) Planosols | | |

(14 marks)