



UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMMES: BACHELOR OF SCIENCE YEAR II IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING, AGRICULTURAL EDUCATION, AGRONOMY, ANIMAL SCIENCE, ANIMAL SCIENCE DAIRY OPTION AND HORTICULTURE

COURSE CODE: CP 201

TITLE OF PAPER: INTRODUCTORY SOIL SCIENCE

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY FOUR (4) QUESTIONS

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QUESTION 1

- (a) Define the following terms as used in soil science.
- (i) Soil morphology
 - (ii) Soil texture
 - (iii) Eluviation
 - (iv) Cation exchange capacity [10 marks]
 - (v) Isomorphous substitution
- (b) Discuss the processes of soil formation and indicate how they contribute to the formation of soils. [15 marks]

QUESTION 2

- (a) Distinguish between physical and chemical weathering of rocks and minerals in the formation of soil. [5 marks]
- (b) Discuss the physical and biogeochemical weathering processes of rocks and minerals in soil formation. [20 marks]

QUESTION 3

- (a) Outline the types of acidity found in soils and comment on the relative importance of each on soil behaviour. [5 marks]
- (b) Discuss the effects of soil acidity on plant growth. [14 marks]
- (c) What strategies would you apply to increase crop yields in acid soils? [6 marks]

QUESTION 4

- (a) Define the term soil structure and explain its importance in crop production [10 marks]
- (b) Discuss the management strategies that you would use to improve or maintain good soil structure in arable agriculture. [15 marks]

QUESTION 5

A chemical analysis of a well-drained mineral soil gave the following contents of elements:

Exchangeable Ca -	1568 kg/ha
Exchangeable Mg -	300ppm
Exchangeable K -	195ppm
Exchangeable Na -	257.6 kg/ha
Exchangeable H -	3mg/100g
Exchangeable Al -	450ppm

Assuming that these cations occupy all the negative charges of this soil:

- (i) Calculate the cation exchange capacity of this soil and express it in cmolc/kg. [15 marks]
- (ii) What is its percent base saturation? [5 marks]
- (c) Evaluate this soil in terms of its suitability for optimum growth of plants. [5 marks]

QUESTION 6

- (a) Define the term organic matter. [3 marks]
- (b) Discuss the effects of organic matter on soil properties for soils that are under agricultural use. [15 marks]
- (c) Comment on the contribution of organic matter to the quality of the environment. [7 marks]