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UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMMES: BACHELOR OF SCIENCE YEAR III IN AGRICULTURAL  
EDUCATION, AGRONOMY AND HORTICULTURE

COURSE CODE: CP 302

TITLE OF PAPER: CROP NUTRITION

TIME ALLOWED: TWO AND A HALF (2.5) HOURS

INSTRUCTIONS: ANSWER TWO (2) QUESTIONS FROM EACH  
SECTION

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THE CHIEF INVIGILATOR

**SECTION 1: SOIL CHEMISTRY**

**QUESTION 1**

- (a) Outline the role of minerals in soil science. [5 marks]
- (b) Discuss the factors which influence the persistence of minerals in soils and comment on the effect these factors might have on the chemistry of soils. [20 marks]

**QUESTION 2**

- (a) Describe in detail the various ways in which organic and inorganic colloids obtain negative charges. [10 marks]
- (b) Discuss the properties of clay minerals which are important in soils that are under crop production and comment on the effect these clay minerals have on the quality of the environment. [15 marks]

**QUESTION 3**

- (a) The soil reaction is a master variable of soil chemistry. Explain the basis of this statement. [4 marks]
- (b) Discuss in detail the acid infertility of soils. [15 marks]
- (c) Outline the strategies that one can apply to increase crop yields in acid soils. [6 marks]

**SECTION 2: SOIL FERTILITY**

**QUESTION 4**

- (a) Discuss the various ways in which nitrogen may be added to soils. [15 marks]
- (b) Outline the management strategies that can be used to enhance the efficiency of nitrogen uptake and utilisation by plants. [10 marks]

**QUESTION 5**

- (a) Outline the various forms of potassium found in soils and comment on the relative importance of each form in the potassium nutrition of plants. [6 marks]
- (b) Discuss the factors which influence the availability of potassium to plants in soils and comment on practical approaches that one would recommend to increase potassium availability in soils. [13 marks]
- (c) Explain the following terms as used in soil fertility:
- (i) Chlorophobic plants
  - (ii) Luxury consumption (6 marks)
  - (iii) Natrophilic plants

**QUESTION 6**

- (a) Explain the basis for the movement of nutrients to the vicinity of plant roots in soils. [5 marks]
- (b) (i) Discuss the transport mechanisms of nutrients from the soil to the plant roots and the factors which influence these mechanisms. (ii) Comment on the relative importance of each mechanism for mobile nutrients and immobile nutrients. [20 marks]