



**SUPPLEMENTARY 2012/2013**

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**UNIVERSITY OF SWAZILAND**

**SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAMMES: BACHELOR OF SCIENCE YEAR THREE 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 FOUR (4) QUESTIONS WITH AT LEAST  
TWO (2) QUESTIONS FROM EACH SECTION.**

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GRANTED BY THE CHIEF INVIGILATOR**

**SECTION 1: SOIL CHEMISTRY**

**QUESTION 1**

- (a) Discuss the charge characteristics of tropical and subtropical soils and indicate the soil materials responsible for the nature of the charge. **[15]**
- (b) Outline the implications of the nature of the charge on nutrient availability to plants. **[5]**
- (c) The effective cation exchange capacity of tropical and subtropical soils has been shown to be very low. Discuss the strategies you would recommend to increase the effective cation exchange capacity of these soils. **[5]**

**QUESTION 2**

- (a) Name the two chemical properties of clay minerals which, in your opinion, are of greatest significance when soils are used for crop production or as a disposal medium for wastes. Discuss the nature and origin of these two properties and explain why, in your opinion, these two properties are of greatest significance. **[25]**

**QUESTION 3**

- (a) Outline the role of minerals in soil science **[7]**
- (b) Discuss the factors which influence the persistence of feldspar minerals in soils and comment on the significance of these factors on plant nutrition. **[18]**

**SECTION 2: SOIL FERTILITY**

**QUESTION 4**

(a) Make a case for the movement of nutrients to the vicinity of plant roots in soils [8]

(b) Discuss, in detail, the mechanisms by which essential plant nutrients are brought to the vicinity of plant roots in soils clearly indicating the importance of each mechanism for mobile and immobile nutrients. [17]

**QUESTION 5**

(a) Discuss the methods of fertiliser application you would recommend to farmers in your home area for the production of maize. Outline, in detail, the merits and demerits of each method. [13]

(b) A fertiliser recommendation for maize in the Middleveld of Swaziland was given as follows:

N – 60 kg ha<sup>-1</sup>

P – 40 kg ha<sup>-1</sup>

K – 45 kg ha<sup>-1</sup>

(i) Calculate the amount of the compound fertiliser 2:3:2(37) that must be applied to supply the entire N required. [4]

(ii) How much P and K would this quantity of fertiliser obtained in (i) above supply to the maize plants? [4]

(iii) Comment on the merits and demerits of using a compound fertiliser in such calculations [4]

**QUESTION 6**

Discuss the transformation of nitrogen and phosphorus in soils and comment on the implications of these transformations on the nutrition of plants. [25]