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 (2) HOURS

INSTRUCTIONS: ANSWER FOUR (4) QUESTIONS WITH AT LEAST TWO QUESTIONS FROM EACH SECTION.

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SECTION 1: SOIL CHEMISTRY

QUESTION 1

(a) Describe the ways in which organic and inorganic colloids obtain negative charges and comment on the significance of these charges in plant nutrition. [10]

(b) Discuss the properties of clay minerals which are important in soils that are under crop production and comment on the contribution of clay minerals to the quality of the environment. [15]

[25]

QUESTION 2

(a) Describe the role of minerals in soil science [5]

(b) Discuss in detail the factors which influence the stability of minerals in soils and indicate the effect these factors have on soil properties and plant nutrition. [20]

[25]

QUESTION 3

Aluminium oxides and hydroxides are among the most abundant minerals in soils of the tropics and subtropics. Discuss the interactions of these minerals with anions in soils and comment on the effect these interactions may have on the mineral nutrition of plants. **[25]**

SECTION 2: SOIL FERTILITY

QUESTION 4

(a) Discuss the ways in which nitrogen is added to soils. [15]

(b) What strategies should be recommended to enhance the uptake and utilization of nitrogen by plants in soils? [10]
[25]

QUESTION 5

(a) Explain the basis for the movement of nutrient elements to the vicinity of plant roots in soils. [5]

(b) (i) Discuss the transport mechanisms of nutrients to the vicinity of plant roots and the factors which influence these mechanisms. [15]

(ii) Comment on the relative importance of each mechanism for mobile and immobile nutrients. [5]
[25]

QUESTION 6

(a) Discuss three methods of fertilizer application that can be recommended to farmers in rural Swaziland. [15]

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

N - 50 kg/ha

P - 25 kg/ha

K - 30 kg/ha

(i) Calculate the amount of the compound fertilizer 2:3:2 (37) that must be added to supply the N requirement. [5]

(ii) How much P and K would this quantity of fertilizer in (i) above supply to the maize plants? [2]

(iii) Comment on the practice of using compound fertilizers in such calculations. [3]