UNIVERSITY OF SWAZILAND

SUPPLEMENTARY 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 ALL QUESTIONS

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SECTION 1: SOIL CHEMISTRY

QUESTION 1

(a) Discuss in detail the acid-infertility of soils.   [15]

(b) What management strategies would you recommend to increase crop yields in acid soils?   [4]

(c) An acid soil was found to contain 4 m.e exchangeable Al per 100g of soil. Calculate the amount of $CaCO_3$ in tonnes per hectare required to neutralise the exchangeable Al to a depth of 15 cm. The soil had a bulk density of 1.2 Mg/m^3 and $CaCO_3$ had a neutralizing value of 90%.   [6]

                    [25]

QUSTION 2

(a) Describe the ways in which organic and inorganic colloids obtain negative charges   [9]

(b) Discuss the significance of clay minerals when soils are used for crop production   [16]
                    [25]

SECTION 2: SOIL FERTILITY

QUESTION 3

(a) Describe the transformation of phosphorous in soils and highlight the implications of such transformations on phosphorus nutrition of plants   [5]

(b) The availability of phosphorus to plants in soil is influenced by a number of factors. Discuss this statement and suggest strategies you would recommend to increase phosphorus availability to plants in such soils.   [15]

(c) An analysis of a soil revealed that it had a phosphorus content of 10 mg kg^{-1} soil and the P sufficiency level for most crop plants is 20 mg kg^{-1} soil. The efficiency of conversion of fertilizer P to soil P is 20%. Calculate the amount of triple super phosphate (22% P) that is required to increase the soil P test to the sufficiency level.   [5]

[25]

QUESTION 4

(a) Discuss three methods of fertilizer application you would recommend to farmers in your home area for the fertilization of cereal crops and highlight the merits and demerits of each method   [14]

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

N -   70 kg ha^{-1}

P -   40 kg ha^{-1}

K -   50 kg ha^{-1}

(i) Calculate the amount of the compound fertilizer 2:3:2 (37) that must be added to supply all the N requirement   [4]

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

(iii) What is the disadvantage of using a compound fertilizer in such recommendations?

[3]

[25]