CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

**THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE
OF BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION**

SOIL 320: SOIL FERTILITY AND PLANT NUTRITION

STREAMS: BSC (AGED) Y3S2   **TIME: 2 HOURS**

DAY/DATE: FRIDAY 09/7/2021   **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS:
- **Answer ALL questions in section A (30 Marks) and any TWO in section B (40 Marks)**
- **Do not write anything on the question paper**

QUESTION ONE

(a)   Explain functions of phosphorous in plants   [6 marks]

(b)   Describe four steps in fertilizer calculations   [4 marks]

QUESTION TWO

(a)   Explain any four (4) benefits of liming agricultural farms   [4 marks]

(b)   Explain why the best management practice concepts were introduced in agricultural

         production   [3 marks]

QUESTION THREE

(a)   Define base saturation and determine the percentage base saturation of a soil with the

         following analysis; 0.6 meq of K, 2.1 meq Ca, 0.7 meq of Mg and CEC of 4.0   meq/100g

                                                                                                           [3 marks]

(b)   State Liebig's law of the minimum   [2 marks]

QUESTION FOUR

(a)   Briefly discuss any four (4) factors determining calcium availability in the soil

[4 marks]

(b)   Explain the relationships between pH and ion toxicity   [4 marks]

SECTION B: ANSWER ANY TWO QUESTIONS (40 MARKS)

QUESTION FIVE

(a)   Explain the three pathways that account for the movement of nutrients in the soil to the   root rhizosphere.   [6 marks]

(b)   Discuss factors influencing the amount of organic matter   [10 marks]

(c)   Discuss physical properties of soil organic matter   [4 marks]

QUESTION SIX

(a)   Calculate amounts of N, P and K in a fertilizer bag of 50kg with an analysis of 18-14-14

[6 marks]

(b)   Discuss five general properties of soil colloids   [10 marks]

(c)   Describe anhydrous ammonium   [4 marks]

QUESTION SEVEN

(a)   For optimum yields of new hybrid maize, you need to apply 75 kg of phosphorus per hectare. How may kilograms of single super phosphate (SSP:0:24:0) should you apply   to obtain optimum maize yields?   [8 marks]

Convert column 1 to 2, multiply by	Element	Oxide	Convert column 2 to1, multiply by
2.29	P	P_2O_5	0.437
1.20	K	K_2O	0.830

(b)   Discuss factors that affect volatilization of nitrogen   [6 makrs]

(c)   Discuss soil related factors which can influence crop yeilds   [6 makrs]