

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE  
IN AGRICULTURE EDUCATION AND EXTENSION

SOIL 320: SOIL FERTILITY AND PLANT NUTRITION

STREAMS: BSC (AGED) Y3S2

TIME: 2 HOURS

DAY/DATE: TUESDAY 10/8/2021

8.30 A.M. – 10.30 A.M

INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A (30 MARKS) ANY  
TWO IN SECTION B (40 MARKS)

SECTION A: ANSWER ALL QUESTIONS IN SECTION A (30 MARKS)

QUESTION ONE

- (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]

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

## SOIL 320

a) Explain functions of phosphorous in plants [6 Marks]

(b) Describe four steps in fertilizer calculations [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

(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 50 kg 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 many 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 to 1 , multiply by
2.29	P	P <sub>2</sub> O <sub>5</sub>	0.437
1.20	K	K <sub>2</sub> O	0.830

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

(c) Discuss soil related factors which can influence crop yields [6 Marks]

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