CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION

SOIL 320: SOIL FERTILITY AND PLANT NUTRITION

STREAMS: BSC (AGED) Y3S1 P/T **TIME: 2 HOURS**

DAY/DATE: TUESDAY 14/04/2020 **2.30 PM – 4.30 PM**

INSTRUCTIONS:

Answer ALL Questions in Section A (30 Marks) any Two in Section B (40 Marks)

SECTION A (30 MARKS): ANSWER ALL QUESTIONS

QUESTION ONE

(a) Using relevant examples, explain the chemical composition of liming materials. [2 marks]

(b) Explain base saturation and determine the percentage base saturation of a soil with a soil containing 0.9 meq of K, 2.5 meq of Ca, 0.5 meq of Mg and a CEC of 6.0 meq/100g. [3 marks]

QUESTION TWO

(a) Discuss single superphosphate (SSP) as a source of P to plants. [3 marks]

(b) Explain the components of the calcium cycle. [3 marks]

QUESTION THREE

(a) Calculate the amounts of N, P and K in a fertilizer bag with an analysis of 12-29-10. [6 marks]

(b) Explain the source of negative electrical charge on clays. [5 marks]

QUESTION FOUR

(a) The type of organic matter, the way it is applied for incorporated into soil and the way it is decomposed influence the physical, chemical and biological balances in the soil and determine the various impacts. Explain [4 marks]

(b) Describe foliar applications of fertilizers on the farm. [4 marks]

SECTION B

QUESTION FIVE

(a) For optimum yields of a new hybrid maize variety, you need to apply 70 kg of phosphorous per hectare. How many kilograms of double super phosphate (SSP: 0:18:0) should you apply to obtain optimum maize yields? [8 marks]

(b) Conversion table

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

(b) Discuss potassium nitrate as a commercial source of potassium fertilizer. [8 marks]

(c) What are the provisions for best management practices? [6 marks]

QUESTION SIX

(a) Explain Ammonification in soils. [5 marks]

(b) The fertilizer salt index was developed to classify fertilizers according to their potential to cause salt injury to plants. Discuss these salt indices. [9 marks]

(c) Explain the management of phosphorus fixation in soils. [6 marks]

QUESTION SEVEN

(a) Discuss how liming agents neutralize acidity in soils. [9 marks]

(b) Illustrate the fertilizer application rates for optimal economic yield that result in maximum profit. [5 marks]

(c) Explain the functions of nitrogen in plants. [6 marks]
