CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF
MASTER OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

SOIL 836: SOIL FERTILITY AND PLANT NUTRITION

STREAMS: MSC (AGED) YISI   **TIME: 3 HOURS**

DAY/DATE: TUESDAY 03/12/2019   **11.30 AM – 2.30 PM**

INSTRUCTIONS:

- **ANSWER ALL QUESTIONS IN SECTION A AND ANY OTHER TWO IN SECTION B**
- **SECTION A (30 MARKS): ANSWER ALL QUESTIONS**

QUESTION ONE

(a)   Discuss the deficiency symptoms of the secondary nutrients on field crops. [6 marks]

(b)   Describe the simple random and systematic methods of soil sampling on a cropped farm.
[4 marks]

(c)   Discuss the sources of error in soil CEC measurement.   [6 marks]

QUESTION TWO

(a)   Explain the various forms of soil nitrogen and their availability for plant uptake.
[6 marks]

(b)   Soil fertility is not just the amount of nutrients, but whether plants can get the nutrients when they need them. Discuss what constitutes a fertile soil.   [5 marks]

(c)   Explain the elemental toxicity of boron, aluminum and chlorine in plants.   [3 marks]

SECTION B (30 MARKS): ANSWER TWO QUESTIONS

QUESTION THREE

(a)   Calculate the amounts of N, P and K contained in 24:42:16 grade of fertilizer.

                [6 marks]

(b)   Discuss how phosphorous leaching and runoff occur in soils.   [3 marks]

(c)   Explain the stage of growth, plant part to sample and number of plants to sample in a maize crop for laboratory tissue analysis.   [6 marks]

QUESTION FOUR

(a)   Explain the problems associated with Pesticide use in agro-ecological systems.

                [4 marks]

(b)   Discuss the commercial sources of potassium fertilizer.   [8 marks]

(c)   Explain the fundamental ways plants take up nutrients through their roots. [3 marks]

QUESTION FIVE

(a)   To obtain good yields from a new hybrid maize variety, you need to apply 46 kg of phosphorus per hectare. How many kilograms of triple super phosphate (TSC: 0:26:0) should you apply to obtain optimum maize yields?   [6 marks]

Alternatively use conversion table

Covert column 1 to 2, multiply by			
2.29	P	P_2O_2	0.437
1.20	K	K_2O	0.830

(b)   Discuss the sources of negative charge in soils.   [3 marks]

(c)   Explain the considerations to be made in nutrient placement during fertilizer application on crops.   [6 marks]