SOIL 211

CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE

SOIL 211: SOIL CHEMISTRY

STREAMS:BSC AGRIC **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 18/12/2024 **8.30 A.M – 10.30 A.M**

INSTRUCTIONS:

- Answer all questions in section A (30 marks) any two in section B (40 marks)
- Do not write anything on the question paper

QUESTION ONE

(a) Outline three (3) sources of salt problems in soils [3 marks]

(c)The pH of soil is an important physio-chemical characteristic. Explain [4 marks]

c) Your plants are showing signs of iron deficiency. You test the soil pH and you find it is 8.0. What would most likely be the best way to eliminate the iron deficiency and why? Justify your choice [2 marks]

QUESTION TWO

(a)Explain how the soil's buffering capacity affects the use of lime in managing soil acidity. [3 marks]

(b)Briefly describe the role of humic substances in enhancing soil fertility [3 marks]

(c)Giving examples differentiate between adsorbate and adsorbent as used in soil chemistry . [2 marks]

QUESTION THREE

(a)As a soil scientist how can knowledge of the climate of an area help you make an initial assessment of soil fertility? [3 marks]

(b) With a well written chemical equation describe a common redox reaction that occur in soils. [3 marks]

(c) Briefly explain any three (3) ways through which organic matter contribute to increased phosphorous availability in the soil [3 marks]

QUESTION FOUR

a) The carbon: phosphorous (C:P) ratio determines whether there is net mineralization or net immobilization of phosphorous. Explain [3 marks]

(b)At low soil pH contraction of the diffuse double layer allows individual soil particles to flocculate, whereas at high soil pH expansion of diffuse double layer causes individual particles to deflocculate or disperse each other. Illustrate [2 marks]

SECTION B: ANSWER ANY TWO QUESTIONS (40 Marks)

QUESTION FIVE

(a) Describe the uptake of water and nutrients by roots [8 marks]

(b) Soil colloids are very important in agricultural fields. Discuss [6 marks]

(c) Discuss three (3) factors affecting anion repulsion [6 marks]

QUESTION SIX

(a) You have been invited to address farmers during a farmer field day in your home county. With your knowledge in soil chemistry, explain to them any four (4) possible causes of acidity in Agricultural fields [8 marks]

(b) As a soil scientist advise farmers on how and when to lime their agricultural fields [12 marks]

QUESTION SEVEN

a) In the ion exchange an ion exchange selectivity is exhibited due to different factors. Discuss [8 marks]

(b)Soil reaction varies due to different factors. Discuss how the following four factors control soil reactions:

(i) Nature of soil colloids [2 marks]

(ii) Soil solution [4 marks]

(iii) Precipitation [3 marks]

(iv)Decomposition of organic matter [3 marks]
