

CHUKA

UNIVERSITY



UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN
AGRONOMY AND HORTICULTURE

HORT 829/SOIL 836: SOIL FERTILITY AND PLANT NUTRITION

STREAMS: MSc. (Agronomy & Horticulture)

TIME: 3 HOURS

DAY/DATE: TUESDAY 05/10/2021
A.M.

8.30 A.M. – 11.30

INSTRUCTIONS:

Answer ALL question in Section A (20 marks) and any two in Section B (40 marks)

SECTION A

Question one

- a) Explain the concept of nutrient interactions in plants and soils. (7 marks)
- b) Explain photomorphogenesis as applied in plant physiology. (4 marks)

Question two

- a) Explain the biogenic regulation of soil pH. (3 marks)
- b) Explain the physical properties of a soil that affect a plant's ability to grow. (6 marks)

SECTION B

Question three

- a) Discuss the basic nutrients for plant growth and development (10 marks)

- b) Explain how the *Bradyrhizobium* and *Rhizobium* species fix nitrogen from soil atmosphere directly to the plants. (10 marks)

Question four

- a) Explain soil colloids giving their significance in plant nutrition. (10 marks)
- b) Discuss the distinctions between manure and commercial fertilizers. (10 marks)

Question five

- a) Explain the classification of soil enzymes into three groups depending on their pH (9 marks)
- b) Suppose that a soil has a pH of 5.0 in water and you need to raise its pH to 6.4 according to plant requirements. The soil needs 10 ml of 0.03N (0.02M) Ca(OH)_2 /10g soil to raise the pH. Calculate the lime requirement of this soil if; the bulk density of the top 15cm of the soil is 1.4g cm^{-3} , and calcite (CaCO_3) with 93% purity is used. (11 marks)
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