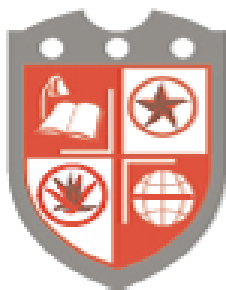


LAIKIPIA



UNIVERSITY

UNIVERSITY EXAMINATIONS

1ST SEMESTER 2025/2026 ACADEMIC YEAR

SECOND YEAR EXAMINATIONS FOR BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGD 213: SOIL FERTILITY AND PLANT NUTRITION

STREAM: R

TIME: 2 HRS

DAY: THURSDAY (14.30-16.30AM)

DATE: 05/02/2026

THIS QUESTION PAPER CONSISTS OF THREE (3 PAGES)

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS:**ANSWER QUESTION COMPULSORY ONE AND ANY OTHER TWO****QUESTION ONE**

(a) Define the following terms

(i) Critical range (2 Marks)

(ii) Fertilizer (2 Marks)

(iii) Diffusion as a nutrient movement (2 Marks)

(b) List FOUR soil factors that can restrict root growth and thereby limit nutrient uptake via root interception. (4 Marks)

(c) What is the fundamental difference between tissue testing and total plant analysis? (6 Marks)

(d) List THREE nutrients that are considered immobile within the plant. (3 Marks)

(e) Name two common measurements used to assess sodium levels in salt-affected soils. (2 Marks)

(f) From a stockist shop a farmer buys 4 bags of urea, 8 bags of triple super phosphate (TSP) and 2 bags of murate of potash. If each bag is 50kg, analyze the grade attained from mixing the fertilizers. (Urea: 46:0:0, TSP: 0:46:0, KCl: 0:0:60). (9 Marks)

QUESTION TWO

(a) Discuss FIVE factors that affect the fertility of soils. (10 Marks)

(b) A soil test for a maize field shows the following percentages of crop requirements are available in the soil: Nitrogen (70%), Phosphorus (45%), and Potassium (90%). According to Liebig's Law, which nutrient is the limiting factor? Justify your answer and predict what would happen if only Potassium fertilizer were applied. (5 Marks)

QUESTION THREE

(a) Outline THREE key differences between organic and inorganic (commercial) fertilizers. (6 Marks)

- (b) The recommended fertilizer rate for a crop is 90 kg N/ha, 45 kg P₂O₅/ha, and 60 kg K₂O/ha. Calculate the quantities of the following straight fertilizers required per hectare: **(6 Marks)**

Urea (46-0-0)

Triple Superphosphate (TSP) (0-46-0)

Muriate of Potash (MOP) (0-0-60)

- (c) Give the ionic forms in which the following elements are taken up by plants. **(3 Marks)**

(i) Calcium

(ii) Iron

(iii) Molybdenum

QUESTION FOUR

- (a) Calculate the amount of N, P₂O₅ and K₂O nutrients supplied per hectare when a farmer applies 80 kg DAP (18:46:0), 100 kg of compound fertilizer (23:23:23) and 70 kg of Urea (46:0:0). **(15 Marks)**

QUESTION FIVE

- (a) Compare and contrast the roles and behavior of Potassium (K) and Calcium (Ca) in plants.

Your answer should cover:

- (i) Their classification (Primary/Secondary). **(2 Marks)**
- (ii) Their primary function(s). **(4 Marks)**
- (iii) Their mobility within the plant. **(2 Marks)**
- (iv) The likely location of initial deficiency symptoms (older vs. newer growth). **(2 Marks)**
- (b) What is the primary role of the Casparian strip in the endodermis? **(5 Marks)**