



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

KRM 300: SOIL FERTILITY AND PLANT NUTRITION

DATE: SCHOOL BASED

TIME:

INSTRUCTIONS:

Answer ALL questions in section A and ANY TWO questions in section B

SECTION A: 30 MARKS (COMPULSORY)

QUESTION ONE (30 MARKS)

- a) Citing relevant examples, explain the following terms
 - i. Beneficial element (2 marks)
 - ii. Isomorphous substitution (2 marks)
- b) Explain three methods of fertilizer application (6 marks)
- c) Citing relevant examples, outline three different organic layers in soil (6 marks)
- d) Describe three mechanisms by which nutrients move from the soil to the surface of the plant root (6 marks)
- e) Explain four ways potassium (K^+) is lost from the soil (4 marks)
- f) Differentiate between immobilization and mineralization (4 marks)

SECTION B: 40 MARKS (ANSWER ANY TWO QUESTIONS)

QUESTION TWO (20 MARKS)

- a) Explain the functions of the following plant elements
 - i. Phosphorus (5 marks)
 - ii. Potassium (5 marks)

- b) Describe the deficiency symptoms of the following plant elements as observed in plants
- i. Nitrogen (5 marks)
 - ii. Calcium (5 marks)

QUESTION THREE (20 MARKS)

- a) Explain five factors affecting nitrification of ammonium nitrogen ($\text{NH}_4^+\text{-N}$) in soils (10 marks)
- b) Discuss five factors influencing quantity of soil organic matter (10 marks)

QUESTION FOUR (20 MARKS)

With the aid of a diagram, describe the following:

- a) Carbon cycle (10 marks)
- b) Nitrogen cycle (10 marks)

QUESTION FIVE (20 MARKS)

- a) Citing examples, discuss five fertilizer classifications (10 marks)
- b) Discuss five factors affecting plant nutrient uptake (10 marks)