



# MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

SECOND YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

SOL 201: SOIL FERTILITY AND PLANT NUTRITION

DATE: 24/7/2019

TIME: 8.30-10.30 AM

---

## INSTRUCTIONS:

Answer question one and two other questions

---

### Section A: 30 MARKS (COMPULSORY)

---

#### QUESTION ONE:

- a) Explain the following factors that affect availability of nutrients in the soil
  - i. Complementary cation effect (5 marks)
  - ii. Soil buffering capacity (7 marks)
- (b) Differentiate between passive and active ion uptake in plants (10 marks)
- (c) State the functions of nitrogen element in plants (3 marks)
- (d) 10 grams of Oven dried soil was leached with 100 ml of 1 N Ammonium Acetate solution and the resultant solution (Leachate A) was filtered and stored for further analysis. The remaining soil was then extracted with 100 ml of 1 N Potassium Chloride solution and the Filtrate (Leachate B) was analyzed. Show the chemical reaction of the above experiment. (5 marks)

#### SECTION B: 40 MARKS (Answer any two questions)

#### QUESTION TWO:

- (a) Explain the factors which influence the amount of nutrients leaching plant roots by mass flow (3 marks)
- (b) Describe the factors that influence nutrient diffusion in soils (12 marks)
- (c) Explain why monocots survive in monocot-dicot intercrop system when potassium element is deficient in the soil (5 marks)

**QUESTION THREE:**

- (a) Describe the classes of inorganic Nitrogen fertilizers. Give examples in each. (12 marks)
- (b) Explain the fate of Nitrogen fertilizers in the soil. (8 marks)

**QUESTION FOUR:**

- (a) Explain the advantage of compound fertilizers over single fertilizers (12 marks)
- (b) State eight (8) factors that are considered in selecting an appropriate fertilizer application method (8 marks)

**QUESTION FIVE:**

- (a) Discuss how you can maintain and improve organic matter in the soil (8 marks)
- (b) Describe Nitrogen cycle (12 marks)