



# MACHAKOS UNIVERSITY

University Examinations for 2017/2018 Academic Year

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES MANAGEMENT

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

SECOND YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE  
IN AGRIBUSINESS MANAGEMENT AND TRADE

SOL 201: SOIL FERTILITY AND PLANT NUTRITION

DATE: 13/12/2017

TIME: 11.00-1.00 PM

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**Instructions:**

Answer question one and two other questions

**SECTION A: 30 MARKS (COMPULSORY)**

**QUESTION ONE**

- a) Describe the factors that affect availability of plant nutrients in the soil (10 marks)
- b) Describe the mechanisms in which nutrients move from the soil to the plant roots (6 marks)
- c) Explain the FOUR (4) common methods of fertilizer application (4 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. The concentration of Ammonium ions in Leachate B was found to be 270 ppm. Given that, (H=1, N=14);
- i. Show the chemical reaction of the above experiment (5 marks)
- ii. Calculate the Cation Exchange Capacity (CEC) of the soil in Milli-equivalent per 100 grams of the soil (5 marks)

**SECTION B: 40 MARKS (ANSWER ANY TWO QUESTIONS)**

**QUESTION TWO: (20 MARKS)**

- (a) Discuss the mechanisms in which plants absorb nutrients (8 marks)

- (b) Describe the factors considered in selecting appropriate method of fertilizer application (8 marks)
- (c) Explain the fate of fertilizers in the soil (4 marks)

**QUESTION THREE (20 MARKS)**

Discuss TEN (10) benefits of organic matter in an ecosystem (20 marks)

**QUESTION FOUR (20 MARKS)**

Discuss the forms in which essential elements are absorbed by plants (20 marks)

**QUESTION FIVE (20 MARKS)**

- (a) Describe the various kinds of nutrients removal by plants (8 marks)
- (b) State the functions of the following elements in plants;
- i. Nitrogen (3 marks)
  - ii. Phosphorus (5 marks)
  - iii. Potassium (4 marks)