



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES
MANAGEMENT

DEPARTMENT OF ENVIRONMENTAL STUDIES

THIRD YEAR FIRST SEMESTER EXAMINATION FOR
BACHELOR OF AGRICULTURAL EDUCATION & EXTENSION,
BACHELOR OF EDUCATION SCIENCES (SPECIAL NEEDS)
BACHELOR OF EDUCATION SCIENCES
KRM 300: SOIL FERTILITY AND PLANT NUTRITION

DATE: 24/7/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

Answer Question One and Two Other Questions

SECTION A: (COMPULSORY)

QUESTION ONE (30 MARKS)

- (a) Explain the factors affecting plant nutrients in the soil. (5 marks)
- (b) Explain the mechanisms in which nutrients move from the soil to the plant roots. (6 marks)
- (c) 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 and the concentration of calcium, magnesium, potassium and sodium ions in Leachate A was found to be 100 ppm, 30 ppm, 78 ppm and 23 ppm respectively. Given that, (H=1, N=14, Na=23, Mg=24, Ca=40 and K=39);
 - (i) Show the chemical reaction of the above experiment (4 marks)
 - (ii) Calculate the Cation Exchange Capacity (CEC) of the soil in Milli-equivalent per 100 grams of the soil . (5 marks)

- (iii) Calculate the Base Saturation of the soil. (10 marks)

SECTION B: 40 MARKS (ANSWER ANY TWO QUESTIONS)

QUESTION TWO (20 MARKS)

- (a) Describe the mechanisms in which plants absorb nutrients (4 marks)
- (b) Explain the common methods of fertilizer application (4 marks)
- (c) Describe the factors considered in selecting appropriate method of fertilizer application (8 marks)
- (d) Explain the fate of Nitrogen fertilizers in the soil (4 marks)

QUESTION THREE (20 MARKS)

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

QUESTION FOUR (20 MARKS)

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

QUESTION FIVE (20 MARKS)

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