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# **UNIVERSITY OF KABIANGA**

**UNIVERSITY EXAMINATIONS**

**2014/2015 ACADEMIC YEAR**

**THIRD YEAR FIRST SEMESTER EXAMINATION**

**FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRO-FORESTRY AND RURAL DEVELOPMENT**

**COURSE CODE: FOR 313**

**COURSE TITLE: SOIL CHEMISTRY AND FERTILITY**

***DATE: 4TH DECEMBER, 2014* *TIME: 2 P.M- 5 P.M***

**INSTRUCTIONS:**

***ANSWER ALL QUESTIONS IN SECTION A AND ANY OTHER TWO QUESTIONS IN SECTION B.***

**SECTION A: (30 marks)**

**Question One**

1. What are colloids? (2 marks)
2. List the properties of organic colloids. (3 marks)
3. What are the sources of charges on soil colloids? (3 marks)

**Question Two**

1. What are effects of pH on availability of nutrients for plant use? (3 marks)
2. Describe the natural conditions that favour acidification of soil. (3 marks)

**Question Three**

1. What is soil fertility? (2 marks)
2. Describe the toxicities observed in plants as a result of deficiencies of essential elements in the soil. (4 marks)

**Question Four**

1. Explain the mechanism that controls ion exchange reactions in the soil. (2 marks)
2. Explain the cause of negative charges in in layer silicate clays. (2 marks)

**Question Five**

1. Explain the meaning of percent base saturation (%BS). (2 marks)
2. How many equivalent-W are needed to neutralize ammonium ions? (2 marks)
3. Given that a kg of soil has the following CEC: 2cmol+ of K; and 2cmol+ of H; 6cmol+ of Al and 4cmol+ of Ca. calculate the base saturation of this soil. (2 marks)

**SECTION B: (40 marks)**

**Question Six**

1. Explain why the demand for chemical fertilizers has increased over time. (10 marks)
2. Discuss the potential effects of fertilizer on environment. (10 marks)

**Question Seven**

Discuss the processes that consume and add hydrogen ions (H+) in the soil systems. (20 marks)

**Question Eight**

1. Explain the effects of the following water quality problems irrigated soils.
2. Alkalinity. (5 marks)
3. Sodicity. (5 marks)
4. Salinity. (5 marks)
5. Discuss the effects of pesticides in the environment. (5 marks)