

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE**

**SOIL 211: SOIL CHEMISTRY**

**STREAMS: BSC AGRIC Y2S1**

**TIME: 2 HOURS**

**DAY/DATE: THURSDAY 06/12/2018**

**2.30 P.M – 4.30 P.M**

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**INSTRUCTIONS**

- **Answer all questions in section A and any two in section B**

**SECTION A: ANSWER ALL QUESTIONS**

- (a) Explain how salt problems in soils usually develop. [3 marks]
  - (b) Explain the forms of phosphorous available for plant uptake. [3 marks]
- (a) Explain the importance of cation exchange reaction in soil fertility. [3 marks]
  - (b) Explain the conditions that cause manganese toxicity. [3 marks]
- (a) Calculate exchangeable sodium percentage (ESP) (for soil  $pH > 4.6$ ) where  $Na = 0.8 \text{ cmolkg}^{-1}$  and  $CEC \text{ by bases} = 8.0 \text{ cmolkg}^{-1}$ . [5 marks]
  - (b) Several factors can affect the expansion or compression of the diffuse double layer. Discuss these factors. [4 marks]
- (a) Explain the relationship between  $pH$  and ion toxicity in soils. [4 marks]
  - (b) One of the more useful calculations in redox reactions is the Nernst equation. This equation allows us to calculate the electric potential of a redox reaction in “non – standard” situations. Derive the Nernst equation. [5 marks]

**SECTION B: ANSWER TWO QUESTIONS**

- (a) Explain the factors that affect CEC in soils. [8 marks]

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- (b) In ion exchange, an anion exchange selectivity is exhibited due to certain factors .  
Discuss. [5 marks]
- (c) Explain the factors that affect P-sorption in soils. [7 marks]
6. (a) Discuss the pools of acidity in soils. [9 marks]
- (b) Explain the corrective treatments for saline and sodic conditions in soil.  
[5 marks]
- (c) Explain the mode of nutrient mobility within the plants. [6 marks]
7. (a) Discuss the factors that influence anion repulsion on a soil colloid surface. [ 8 marks]
- (b) Explain the primary minerals in soils. [6 marks]
- (c) Explain the factors that influence mineralization andin mobilization of nutrients in  
soils. [6 marks]
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