

Magnesium -

acidity + liming

UNIVERSITY OF KABIANGA

UNIVERSITY EXAMINATIONS THIRD YEAR FIRST SEMESTER 2016/2017

FOR 313: SOIL CHEMISTRY AND FERTILITY

INSTRUCTIONS TO CANDIDATES:

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION (30 MARKS)

- Explain the following in the context of soil chemistry and fertility
  - Active acidity (2 marks)
  - Exchangeable acidity - (2 marks)
  - Non-exchangeable acidity (2 marks)
  - Total acidity (2 marks)
- Describe the characteristics of humus (4 marks)
- Explain how the following factors alter the soil water quality
  - Magnesium (2 marks)
  - Scale deposit (2 mark)
  - Trace elements (2 marks)
  - Corrosion and encrustation (4 marks)
- What are soil colloids? [1 mark]
  - Name the types of Soil Colloids [2 marks]
- Explain how the type of charges on soil colloids are formed pH dependent - [2 marks]
  - Explain the properties imparted to soils by colloids [3marks]

SECTION B: ANSWER ANY TWO QUESTIONS IN THIS SECTION (40 MARKS)

- Describe the properties of layer silicate 2:1 non-expanding mineral (mica) [4 marks]
  - Explain the cause of negative charges in layer silicate clays [4 marks]
  - The most common problem associated with acidity in soils is "Aluminium Toxicity" Explain [4 marks]
  - Explain the management of soil pH lime [4 marks]
  - Explain alteration of pH by acid rain [4 marks]
- Explain the meaning of the following in reference to movement of gases and water within soil
    - Mass flow [4marks]
    - Diffusion [4marks]
    - Darcy's law [3 marks]
  - Fick's law of Diffusion can be expressed as  $J = -Ddc/dx$ 
    - What does the J, d and c represent in the equation [3 marks]
    - Describe what strongly influence the ,D, parameter in Fick's law [6marks]
- Discuss soil fertility evaluation and its control [10marks]
  - Describe management practices to maximise nutrient cycling and nutrient use efficiency in crop lands [10 marks]

Movement along gradient of water

Soil protection - cover crop