MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2012/2013

SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN HORTICULTURE WITH INFORMATION TECHNOLOGY (MAIN CAMPUS)

SHC 210: SOIL CHEMISTRY

Date: 17th July, 2013 *Time: 8.30 – 10.30 a .m.*

SHC 210: SOIL CHEMISTRY

INSTRUCTIONS:
*ANSWER **ALL** QUESTIONS IN SECTION A AND ANY **TWO** IN SECTION B*

SECTION A

Q1 a) Using appropriate illustrations, describe the structures of montmorillonite and kaolinite **(10 marks)**

b) Explain why kaolinite expands while montmorillonite does not. **(2 marks)**

Q2 a) Define the term calcium carbonate equivalent. **(2 marks)**

b) Calculate the calcium carbonate equivalents of calcium hydroxide and calcium oxide and hence determine which of the two materials is a more effective liming material. **(4 marks)**

c) Discuss the factors that determine the liming requirements of a soil. **(8 marks)**

Q3a. Define the term cation exchange capacity (CEC). **(2 marks)**

b. Explain the factors that affect the CEC of a soil. **(4 marks)**

c) State two management practices that can be used to increase the CEC of a soil. **(2 marks)**

Q4. Outline the roles of organic matter in soils. **(6 marks)**

SECTION B: *ANSWER ANY **TWO** QUESTIONS*

5 a) Define the term colloid and name the five types of soil colloids. **(6 marks)**

b) Describe the ways in which electrical charges develop on soil colloids **(9 marks)**

6 a) Describe saline, sodic and saline-sodic soils using the following chemical properties: pH, electrical conductivity and exchangeable sodium percentage. **(9 marks)**

b) State the problems of plant growth under: i) Saline and ii) sodic soils. **(2 marks)**

c) Describe how you can reclaim saline and sodic soils. **(4 marks)**

7 a) Define the term phosphorus fixation and explain how it differs with nitrogen fixation **(4 marks)**

b) Using appropriate equations/illustrations, show how phosphorus is fixed in soils at both low and high pH. **(6 marks**

c) Discuss the factors that affect phosphorus fixation in soils. **(5 marks)**