JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY UNIVERSITY EXAMINATIONS 2012/2013

2ND YEAR 1ST SEMESTER EXAMINATION OF BACHELOR OF EDUCATION (SCIENCE)

REGULAR

COURSE CODE: SBT 202

COURSE TITLE: PLANT MINERAL NUTRITION

DATE: 14/8/13 **TIME: 2.00 - 4.00 PM**

DURATION: 2 HOURS

INSTRUCTIONS

1. **Answer ALL questions in Section A and ANY Two questions in Section B.**

2. **Write all answer in the booklet provided.**

SECTION A: 30 MARKS

1. Briefly comment on the relationship between phosphate mineral in soil and soil pH with regard to availability. (2 marks)
2. Explain how plant cells avoid ammonium toxicity. (2 marks)
3. Explain the difference between apoplast and symplast pathways in mineral nutrients absorption by plants. (2 marks)
4. Explain the term chellation highlighting its advantages in mineral nutrients absorption. (2 marks)
5. Explain how soil texture influence concentration of mineral nutrients in soil solution. (2 marks)
6. Show how temperature and soil water content affects nutrients supply to plants by mass flow. (2 marks)
7. Give any **three** differences between active and passive transport. .(3 marks)
8. Explain the term essential mineral elements and highlight how it can be determined. (5 marks)
9. Explain the significance of mineral nutrients mobility within plants and soil highlighting **three** examples in each case. (5 marks)
10. Explain the relationship between plant growth, health and nutrients availability. (5 marks)

SECTION B: 40 MARKS (Answer Any Two Questions)

11.

a. Using a well labeled diagram describe how you would identify key nutrients deficiencies of mobile nutrients in plants. (10 marks)

b. Describe what you understand by effective diffusion coefficient explaining how it affects movement of mineral nutrients within soil. (10 marks)

c. Citing relevant examples comment on physiological roles of mineral elements in plants. (5 marks)

d. According to (Curtis, 1926), transpiration is a necessary evil, explain. (5 marks)

e. Discuss important factors that determine mineral absorption by both active and passive transport in plants. (10 marks)

12.

a. Discuss phosphorus assimilation in plants highlighting its major functions in plant growth. (10 marks)

b. A soil analysis carry out at JOOUST farm showed that a soil sample contains 15 ppm (part per million) of N, 10 ppm of P and 10 ppm of K. The area is to be planted with jackfruit trees at a distance of 9.0 m x 9.0 m and each tree requires 0.7 kg N, 0.5 kg P and 0.6 kg K. Assuming one hectare contains 3 millions kg of soil. Calculate the amount of urea 46-0-0, CIRP 0-36-0 and muriate of potash 0-0-60 to be applied to a hectare of jackfruit trees. (The nutrients in fertilizer are expressed in N, P and K and 1 hectare = 10,000 m^2). (10 marks)

13. Discuss plant adaptation mechanisms to acidic soils. (20 marks)