JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF AGRICULTURAL AND FOOD SCIENCES

THIRD YEAR SECOND SEMESTER UNIVERSITY EXAMINATION FOR

THE DEGREE OF BACHELOR OF SCIENCE IN SOIL SCIENCE

2017/2018 ACADEMIC YEAR

REGULAR

COURSE CODE: ALS 3327

COURSE TITLE: SOILS WATER NUTRIENTS RELATIONSHIP

EXAM VENUE: **STREAM: BSc. (Soil Science)**

DATE: **EXAM SESSION:**

TIME: 2 HOURS

Instructions:

1. **Answer ALL questions in section A and ANY other 2 Questions in section B.**
2. **Candidates are advised not to write on question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A [30 MARKS]

Answer ALL questions from this section

1a. State Darcy's law (2 marks)
b. State any two effects of dissolved salts on plants (2 marks)

2. Explain the following soil water constants
   a. Saturation capacity (2 marks)
   b. Field capacity (2 marks)
   c. Permanent wilting point (2 marks)

3 a) Explain why soils with a high CEC have a high water holding capacity (3 marks)
b) State three advantages of negative charges on soil colloids (3 marks)

4. Explain the characteristics of the following soil textural classes based on field experience
   a. Sandy (3 marks)
   b. Silt loam (3 marks)
   c. Clay Loam (3 marks)

5. Rice plants with a root zone up to 20 cm is planted in clay soils of specific gravity 1.48 g/cm^3 . Calculate the field capacity given that the depth of water within the pores is 30 cm. (Area of the plot is 2 m x 3 m and density of water is 1 g/ cm^3)

(5marks)

SECTION B [40 MARKS]

Answer ANY TWO questions from this Section.

6. a. Discuss the importance of water in plant growth (12 marks)
   b. Explain the following components of soil water potential. (8 marks)
      i. gravitational potential
      ii. Matric potential
      iii. Pressure potential
      iv. Solute potential

7. Discuss the characteristics of the following salt affected soils explaining how they can be reclaimed. (20 marks)
   a. Saline soils
   b. Sodic soils
   c. Saline - sodic soils

8. Explain how the following affect water infiltration (20 marks)

a. Soil water content

b. Soil sealing

c. Surging

d. Compaction

e. Tillage

9. Discuss the following methods of soil water measurements. (20 marks)

a. Gravimetric

b. Feel and appearance

c. Tensiometers

d. Electrical resistance instruments