



**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**

**2024/2025 ACADEMIC YEAR**

**SIAYA**

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**COURSE CODE: ALS 3327**

**COURSE TITLE: SOIL-WATER-NUTRIENT RELATIONSHIPS**

**DATE:** **STREAM: BSc. Soil Science**

**TIME: 2 HOURS** **SESSION:**

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**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.**

1. Explain the importance of soil porosity in the determination of infiltration and drainage of water in different soil types. **(5 Marks)**
2. Define the following soil water concepts in relation to their availability to plants: **(6 Marks)**
  - (a) Capillary water
  - (b) Gravitational water
  - (c) Hygroscopic water
3. Relate hydraulic conductivity to soil water movement. **(4 Marks)**
4. Why is field capacity and permanent wilting point significant in irrigation scheduling? **(5 Marks)**
5. Explain the variation of soil-water retention properties across different soil types. **(5 Marks)**
6. Describe two ways in which excessive irrigation can negatively impact soil properties. **(5 Marks)**

**SECTION B [40 MARKS]**

**Answer ANY TWO questions from this Section.**

8. a) Discuss the impact of soil moisture content on plant nutrient uptake and overall crop productivity. **(10 Marks)**
  - b) Justify the significance of soil water retention curve in irrigation management. **(10 Marks)**
9. a) Discuss the factors affecting infiltration rate and their implication on water availability for plant use. **(10 Marks)**
  - b) Discuss the relationship between evapotranspiration and soil moisture balance in crop production. **(10 Marks)**
10. a) Explain the role of soil organic matter in improving water retention and nutrient availability in agricultural soils. **(10 Marks)**
  - b) Demonstrate the key water management strategies for salinity control in irrigated soils. **(10 Marks)**