



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF AGRICULTURAL AND FOOD SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN BSC.
AGED, BSC SOIL SCIENCE, 3RD YEAR, 2ND SEMESTER
2024/2025 ACADEMIC YEAR

SIAYA CAMPUS

COURSE CODE: APB 1312

STREAM: BSC. AGED AND SOIL SCIENCE

COURSE TITLE: PRINCIPLES OF IRRIGATION AND DRAINAGE

Date:

Instructions:

- 1. Answer Question 1 and ANY other TWO questions.**
- 2. Answers to Questions must be written in the Answer Booklets**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION 1

- a) Define the following terms as used in irrigation: **(5 Marks)**
- i. Saturation
 - ii. Field capacity
 - iii. Wilting point
 - iv. Groundwater table
 - v. Effective rainfall
- b) How does soil texture and soil structure influence effective rainfall? **(5 Marks)**
- c) A farmer observes that after heavy rainfall, the water drains quickly in one of his fields but remains longer in another field. Explain this observation and suggest an appropriate irrigation strategy for each field. **(5 Marks)**
- d) Analyze the relationship among plant properties, soil properties, and meteorological conditions that is essential in determining the rate of water uptake by crops. **(7 Marks)**
- e) Design an irrigation management strategy that optimizes water use efficiency while preventing problems such as salination and nutrient leaching. Justify your approach based on the principles of irrigation management. **(8 Marks)**

QUESTION 2

Demonstrate the process of evapotranspiration, including the roles of evaporation and transpiration, and highlighting the key factors that influence its rate. Support your answer with examples. **(20 marks)**

QUESTION 3

A farmer is planning to adopt surface irrigation for a 10-hectare field. The soil in the field has high moisture-holding capacity but forms a dense crust upon drying. The available water supply has a relatively high salinity level. The farmer primarily grows alfalfa and grains but is considering integrating some row crops in the future. Using this information, analyze the suitability of different surface irrigation methods for this field. With sound justification, recommend the most appropriate method, considering assorted relevant factors. **(20 Marks)**

QUESTION 4

Critically analyze the impact of salinity, permeability, and toxicity on crop productivity. **(20 Marks)**

QUESTION 5

Relate the concept of Soil-Plant-Atmosphere Continuum (SPAC) to soil-plant-water relations. **(20 Marks)**