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**UNIVERSITY EXAMINATIONS  
2022/2023 ACADEMIC YEAR**

**THIRD YEAR SECOND SEMESTER  
MAIN EXAMINATIONS**

**FOR THE DEGREE OF  
BACHELOR OF SCIENCE AGRICULTURE BIOTECHNOLOGY**

**COURSE CODE: AEN 322**

**COURSE TITLE: IRRIGATION AND DRAINAGE**

**DATE: 25<sup>TH</sup> APRIL 2023**

**TIME: 2 – 4 PM**

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**INSTRUCTIONS TO CANDIDATES**

Answer **Question 1 (Compulsory)** and any other **TWO** questions

This paper consists of **3** printed pages. Please Turn Over



### QUESTION ONE 30 MARKS COMPULSORY

- a) Define following irrigation terms (6 marks)
  - i. Irrigation scheduling
  - ii. Evaporation
  - iii. Transpiration
- b) State four ways of applying water to crops (4marks)
- c) Outline five sources of excess water on the farm (5marks)
- d) Illustrate two types of sub-surface irrigation techniques (4marks)
- e) Highlight four riparian rights and responsibilities(4marks)
- f) Explain the main functions of the Hooghoudt equation (4marks)
- g) A soil is sampled from the field and weighed 180 g. The soil is then dried and the weight is 130 g. Calculate the gravimetric water content. (3 marks)

### QUESTION TWO: 20 MARKS

- a. Describe the different types of irrigation efficiency (10 marks)
- b. A stream size of 180 lit /sec was released from the diversion headwork to irrigate a land of area 1.8 hectares. The stream size when measured at the delivery to the field channels is 150lit/sec. The stream continued for h hours. The effective root zone depth is 1.80m. The application losses in the field are estimated to be 450m<sup>3</sup>. The depth of water penetration was 1.80m and 1.20m at the head and tail of the run respectively. The available water holding capacity of the soil is 21cm/m and irrigation was done at 60% depletion of Am. The stream size delivered to the plot was 100 lit/sec. Calculate various efficiencies of the system (10marks)

### QUESTION THREE: 20 MARKS

- a. Discuss five factors to be considered when estimating irrigation water (10marks)
- b. Explains five goals of the National Water Services Strategy in Kenya (10 marks)

**QUESTION FOUR: 20 MARKS**

- a. Describe five methods of sub-surface drainage (10 marks)
- b. Discuss the positive and negative environmental aspects of subsurface drainage.

**(10 marks)**

**QUESTION FIVE: 20 MARKS)**

- a. Discuss the different components of water requirement equation for the crop **(10 mark)**
- b. What measures are recommended to reduce the impact of drained water from farmland on the environment? **(10 marks)**