



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

AUGUST SESSION EXAMINATION FOR

BACHELOR OF EDUCATION

KRM 403: IRRIGATION AND DRAINAGE

DATE: SCHOOL BASED

TIME:

INSTRUCTIONS:

Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

- a) Define the following terms as used in irrigation and drainage technology;
- Irrigation (1 mark)
 - Effective soil depth (2 marks)
 - Salinity (2 marks)
 - Soil pH (2 marks)
- a) Explain three classes of soil water (3 marks)
- b) Explain the two methods of infiltration measurement (4 marks)
- c) Discuss any two climatic factors that affect consumptive use of water in plants (4 marks)
- d) Explain four components of irrigation systems (6 marks)
- e) Outline two methods of determining permanent wilting point of crops (2 marks)
- f) You are requested to carry out a soil survey for improvement of a poorly drained area. Discuss the factors that would need to be considered to accomplish this task. (4 marks)

QUESTION TWO (20 MARKS)

- a) A stream size of 150 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

120lit/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 440m^3 . 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. Find E_c , E_f , E_a , E_s and E_d . If the stream size delivered to the plot was 100 lit/sec. (12 marks)

- b) Explain two major roles of land drainage (4 marks)
- c) Explain two techniques of draining excess water (4 marks)

QUESTION THREE (20 MARKS)

- a) The surface irrigation application methods are classified as: Wild flooding, Basins, Borders and furrows.
 - i. What do you understand by the term; Soil? (12 marks)
 - ii. Critically differentiate the four methods (12 marks)
- b) Discuss the benefits of drainage in agriculture. (8 marks)

QUESTION FOUR (20 MARKS)

- a) Using diagrams, explain how infiltration rate test may be carried out in a paddy field (8 marks)
- b) Using diagrams describe
 - i) Basic Infiltration Rate (2 marks)
 - ii) Accumulated infiltration (2 marks)
- c)
 - i) Define the term field capacity
 - ii) Explain how field capacity it is obtained in the field (5 marks)
- d) Explain three factors that affect water requirement for crops (3 marks)

QUESTION FIVE (20 MARKS)

- a) Describe six steps followed in the design of land drainage system (6 marks)
- b) Explain two benefits of irrigation (2 marks)
- c) Using a diagram, discuss sprinkler method of irrigation giving advantage over other methods. (8 marks)
- d) Explain two possible sources of excess water in a poorly drained field. (4 marks)