



# **UNIVERSITY OF EMBU**

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**2016/2017 ACADEMIC YEAR**

**FIRST SEMESTER EXAMINATION**

**THIRD YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE  
IN (AGRICULTURE) AND BACHELOR OF SCIENCE (HORTICULTURE)**

**AEB 302: IRRIGATION WATER MANAGEMENT**

**DATE: DECEMBER 1, 2016**

**TIME: 2:00-4:00PM**

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**INSTRUCTIONS:**

**Answer Question ONE and ANY other TWO Questions**

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**QUESTION ONE (30 MARKS)**

- a) Explain how the soil structure is related to water infiltration. (3 marks)
  - b) With the aid of a diagram show the position of the various soil layers of a soil profile. (3 marks)
  - c) A 15m by 30 m plot of land is irrigated with 900 litres of water. How much water is this in mm of depth? (3 marks)
  - d) How does the rain distribution over a period of days affect the amount of water in the soil? (3 marks)
  - e) Distinguish wild flooding from boarder irrigation water system. (3 marks)
  - f) Explain how the humidity of a region affects irrigation water needs. (3 marks)
  - g) State three sources of soil salination. (3 marks)
  - h) Differentiate granular from blocky soil in terms of infiltration and water holding capacity. (3 marks)
  - i) Explain the effect of temperature on evapotranspiration. (3 marks)
  - j) Explain the difference between line-pipe and sub-surface drainage system in terms cost of installation and opportunity cost of land. (3 marks)
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**QUESTION TWO (20 MARKS)**

- a) Discuss crop water needs with reference to the standard crop water needs and the different stages of growth of a given crop. (10 marks)
- b) Describe the pan method of determining evapotranspiration. (6 marks)
- c) Identify the possible sources of error when using the sunken Colorado pan method? (4 marks)

**QUESTION THREE (20 MARKS)**

- a) The 142 day rice variety is to be grown in Mwea irrigation scheme. Through close scrutiny of the developmental stages of rice and its requirements estimate total crop water needs. (10 marks)
- b) Discuss the four sub-systems of a surface irrigation system. (10 marks)

**QUESTION FOUR (20 MARKS)**

- a) A plot of land measuring 100m by 40 m is to be irrigated with 6 mm of water. The effectiveness of water application is 0.7. Calculate the quantity of water that must be supplied to the plot. (6 marks)
- b) Discuss sprinkler irrigation system design with respect to;
- i) Automation possibilities (3 marks)
  - ii) Health of workers (3 marks)
  - iii) Water application efficiency (4 marks)
  - iv) Asset financing (4 marks)

**QUESTION FIVE (20 MARKS)**

- a) Discuss three possible sources of water inflow into an area with excess water. (6 marks)
- b) With the aid of diagrams explain one popular surface drainage land forming technique. (8 marks)
- c) In sub-surface drainage one assumption usually made is that water flow is one dimensional. Explain under what conditions this assumption can safely be made. (6 marks)

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