UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER
SPECIAL /SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF SCIENCE AGRICULTURE BIOTECHNOLOGY

COURSE CODE: AEN 322

COURSE TITLE: IRRIGATION AND DRAINAGE

DATE: **10TH AUGUST 2023** **TIME: 2 – 4 PM**

INSTRUCTIONS TO CANDIDATES
Answer Q**uestion 1 (Compulsory)** and any other **TWO** questions

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

QUESTION ONE COMPULSORY: 30 MARKS

a. Differentiate between the terms irrigation and drainage (2marks)

b. Explain the following moisture ranges (6marks)

   i. Field capacity

   ii. Permanent wilting point

   iii. Soil moisture deficit

c. A soil has field capacity moisture of 30mm per meter depth. Given the depth of the root zone =1.0mm and the bulk density of the soil is 1500kg/m3. Calculate the depth of water stored in the root zone per metre (4marks)

d. Outline four ways in which irrigation water can be lost (4marks)

e. Highlight five reasons for carrying out land drainage(5marks)

f. State four ways in which the drainage systems can be maintained (4marks)

g. Give five effects of sodium toxicity in the soil (5marks)

QUESTION TWO: 20 MARKS

A farmer is supplied with water through a canal. He wants to grow French bean by furrow irrigation

Explain the following

a) The factors to consider before land preparation (10 marks)

b) The advantages and limitations of using this method (5marks)

c) The irrigation procedure (5marks)

QUESTION THREE – 20 MARKS

a. Define consumptive use of water in irrigation and discuss four climatic factors that affect it. (**10 marks**)

b. Explain the methods used in determination of consumptive use **(10marks)**

QUESTION FOUR – 20 MARKS

a. Explain five factors affecting duty of water in an irrigation project **(10 marks)**

b. Discuss the following drainage systems: (i) Open parallel ditches, (ii) Conventional drainage, (iii) Water table control, and (iv) Sub irrigation. **(10 marks)**

QUESTION FIVE – 20 MARKS

a. Briefly explain the surface methods of irrigation. **(10 marks)**

b. A crop has in effective root zone of 120 cm (1.20 m) prior to irrigation; soil samples were taken from different depths to determine the moisture status of the soil.

Depth of root zone (m)	Weight soil sample (gm)	Weight of oven dry soil (g)
0 – 0.30 m	98.80	94.60
0.30 – 0.60 m	96.60	92.10
0.60 – 0.90 m	95.00	90.60
0.90 – 1.20 m	94.00	89.40

The water holding capacity of the soil at field capacity is 19.60 cm/meter. The apparent specific gravity of the soil is 1.60. Determine the moisture content in the root zone at different depths, total depth of water available in the root zone at different depths, total depth of water available in the root zone and the soil moisture deficit **(10 marks)**