JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

UNIVERSITY EXAMIMATION FOR THE DIPLOMA IN BUILDING AND CIVIL ENGINEERING

3RD YEAR 2ND SEMESTER 2022/2023 ACADEMIC YEAR

SPECIAL EXAMS

CENTRE: MAIN CAMPUS

COURSE CODE: TBC 2314

COURSE TITLE: IRRIGATION AND DRAINAGE TECHNOLOGY

EXAM VENUE: **STREAM: Dip. BUILD & CIV ENG**

DURATION: 2 HOURS

Instructions

1. **Answer question 1 (Compulsory) and ANY other two questions**

2. **Candidates are advised not to write on question paper**

3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE (30 Marks)

a. Explain what you understand by the following terms and their importance as applied in irrigation and drainage; **(15 Marks)**

    i. Capillary water

    ii. Soil moisture tension

    iii. Consumptive use of water

    iv. Irrigation interval

    v. Irrigation efficiency

b. With reference to different water sources explain the following; **(8 Marks)**

    i. Water availability

    ii. Different methods of tapping water from different water sources

c. With reference to spring water gravity supply explain the following; (Use a diagram of a sloppy terrain for illustration) **(7 Marks)**

    i. Spring protection

    ii. Placement and connection of water supply components (Intake, reservoir tank and tap stand)

QUESTION TWO (20 Marks)

a) Outline various farm or land conditions that may necessitate the need for drainage (6 Marks)

b) In Kenya, the most widely used drainage system is surface drainage which uses open drains. Outline the advantages and disadvantages of open drains (8 Marks)

c) Green house is the most modern irrigation technology and thus the current technology of choice. Briefly discus (6 Marks)

QUESTION THREE (20 Marks)

a) Water occurs in the soil pore space in various proportions and three main forms are recognized (gravity, capillary and hygroscopic). Discuss the role of each of these three forms of soil moisture in connection with irrigation   10 marks

b) Briefly explain the following terminologies in connection with soil-plant-water relationship   10 marks

    i. Saturation capacity

    ii. Field Capacity

    iii. Permanent Wilting Point

QUESTION FOUR (20 Marks)

Below is data for a homogeneous soil profile

- Field capacity   Fc=17[%]
- Wilting point   Pw=7 [%]
- Soil density γ_S=1.3[g/cm^3]
- Water density γ_W=1.0[g/cm^3]
- Main root zone   Zr=0.4[m]
- Readily Available water = 60% of the Available Water
- Actual crop consumptive use (Et$_c$) = 5mm/day

Using the data above, calculate:-

i.   The available water volume per hectare
ii.   Available Depth of water for 1m layer
iii. Depth of Available Water in the effective root zone
iv. The Available Water Volume in a hectare in the effective root zone
v.   Irrigation interval

QUESTION FIVE   (20 Marks)

Discus the role of the following physical characteristics of soil in influencing decisions in irrigation planning

i.   soil texture   10 marks
ii. Soil Structure   10 marks