ELIZADE UNIVERSITY, ILARA-MOKIN
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
FIRST SEMESTER 2020/2021 SESSION

HOD'S SIGNATURE

Course Title: Irrigation and Drainage Eng. **Course Code:** CVE 403 **UNITS:** 3

INSTRUCTION: ANSWER QUESTIONS ONE (1) AND SIX (6) AND ANY OTHER TWO (2) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS
EXAMINATION TIME: 2^1/2hrs

QUESTION ONE (20MARKS)

1a. Given the section slope (x), base width (b) and depth (y) of a trapezoidal channel. Show that the hydraulic radius (R) equals

$$\left(\frac{(b+xy)y}{b+2y\sqrt{(1+x^2}}\right)$$

(5 Marks)

1b. A Trapezoidal channel of width 4.0 m with a bed slope of 1: 1000 and side slope of 2:1 discharge volume of water at a rate of 25 m^3/s. Determine the depth of water in the channel using

a. Chezy constant of 55
b. Manning constant of 0.017
c. Coefficient of discharge 0.78 **(11 Marks)**

1c. In short sentences, briefly explain the following terms as related to crop-water requirements: permanent wilting point, duty of water, base period, delta.

(4 Marks)

QUESTION TWO (20MARKS)

2a. Differentiate between adsorbed water and absorbed water.

(2 Marks)

2b. The base period, duty of water and area under irrigation for various crops under canal system are given in the **Table 1** below. If the losses in the reservoir and canal 19% and 38% respectively. Determine the reservoir capacity.

Table 1:

Crops	Wheat	Sugarcane	Cotton	Rice	V.table
Base period (days)	100	310	190	110	100
Duty (ha/cumec)	1800	1550	1500	850	720
Area (ha)	15000	11000	6000	8500	6500

(10 Marks)

2c. Give the classification of soil water based on its availability to the plants in **(3 Marks)**

2d. What are the factors that affect the capacity to irrigate the land? **(5 Marks)**

QUESTION THREE (20MARKS)

3a. What are the different types of flow that are available? Give examples of the different types. **(4 Marks)**

3b. State all the equations for flow rate in open channel defining all necessary parameters withtheir units **(6 Marks)**

3c. Find the dimensions of a rectangular concrete channel carrying a flow of 150 m3/sec, witha HGL slope of 0.015 and a mean velocity of 10.2 m/sec. Given: Q = 150 m3/sec V = 10.2 m/sec Sf = 0.015 Assume: Manning's n = 0.013 (concrete channel) **(10 Marks)**

QUESTION FOUR (20MARKS)

4a. List and give a thorough explanation of two available water supply systems. **(5 Marks)**

4b. Explain with the use of a chart the methods of distribution of irrigation water. **(3Marks)**

4c. Determine the flow rate in a rectangular concrete channel with a width of 3 m and a HGL slope of 0.001 m/m when the depth of flow is 1.5 m. Assume n = 0.014. **(5Marks)**

4d. What is infiltration as related to irrigation engineering **(2mrks)**

4e. Mention 5 direct and 5 indirect benefit of irrigation. **(5mrks)**

QUESTION FIVE (20MARKS)

5a. Give a brief explanation of what a distribution system is **(4 Marks)**

5b. Explain with salient points the various ways in which water could be forced into the distribution system **(6 Marks)**

5c. Explain Storage Capacity of a Distribution Reservoir **(6 Marks)**

5d. Give a brief explanation of reservoir types under the following subheadings

i. Surface Reservoir
ii. Elevated Reservoir **(4 Marks)**

QUESTION SIX (20MARKS)

6ai. What is infiltration as related to irrigation engineering **(2Marks)**

6aii. Briefly explain what Inundation Irrigation is **(2 Marks)**

6b. Mention and explain 3 methods of distribution of irrigation water **(6 Marks)**

6c. Mention 5 direct and 5 indirect benefits of irrigation. **(5 Marks)**

6di. Mention 5 factors that govern the necessity of irrigation. **(2 Marks)**

6dii. List and explain the types of open drains available **(3 Marks)**