



FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING  
FIRST SEMESTER EXAMINATION (MARCH 2018)  
2017/2018 ACADEMIC SESSION

HOD'S SIGNATURE

**Instructions:**

- 1) Attempt any four Questions
- 2) Time Allowed: 3 hours
- 3) SEVERE PENALTIES APPLY FOR MISCONDUCT,  
CHEATING, POSSESSION OF UNAUTHORIZED  
MATERIALS DURING EXAMINATION

**Course Title: Drainage and Irrigation Engineering**

**Course Code: CVE 403**



# ELIZADE UNIVERSITY, ILARA – MOKIN

FACULTY OF ENGINEERING  
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING  
First Semester 2017/2018 Session

Course Title: Drainage and Irrigation Engineering Course Code: CVE 403 Units: 3

Instruction: Attempt any four Questions Time Allowed: 3 hours

## Question 1 (15 marks)

- Write a short note on irrigation and drainage. (8 marks)
- Water flows in a rectangular concrete open channel that is 12.0 m wide at a depth of 2.5 m. The channel slope is 0.0028. Find the water velocity and flow rate. (7 marks)

## Question 2 (15 marks)

- Write a short note on relationship between soil and water. (8 marks)
- A trapezoidal channel, bottom width 6 m and side slopes  $45^\circ$ , flows 1.2 m deep on a slope of 0.0009. For a value of  $n = 0.025$ , what is the uniform discharge? (7 marks)

## Question 3 (15 marks)

- Explain in detail the term water quality and SAR for irrigation. (7 marks)
- Soil samples from a farm land were analyzed the results are as follows:
  - sand 58%, silt 34%, clay 6%;
  - 25% clay, 13% silt, 62% sand;
  - 23% clay, 21% silt, 56% sand; and
  - 21% clay, 30% silt, 49% sand.

Use these results to classify the soil texture based on US Department of Agriculture (USDA) classifications. (8 marks)

## Question 4 (15 marks)

A stream size of 150 l/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 120 l/sec. The stream continued for 4 hours. The effective root zone depth is 1.80 m. The application losses in the field are estimated to be  $440 \text{ m}^3$ . The depth of water penetration was 1.80 m and

1.20 m 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. The stream size delivered to the plot was 100 l /sec. Determine:

- i. Water Distribution Efficiency ( $E_d$ ),
- ii. Field Canal Efficiency ( $E_b$ )
- iii. Water storage efficiency ( $E_s$ )
- iv. Water application Efficiency ( $E_a$ )
- v. Water Conveyance efficiency ( $E_c$ ) (10 marks)

#### Question 5 (15 marks)

- a. Explain in detail various components of irrigation and irrigation efficiency. (10 marks)
- b. A farm has a total area 1000 m<sup>2</sup>. The 30 cm layer is a clay loam texture and the actual water content is 5% by weight. Find the required amount of water to increase the water to the level of available water. (5 marks)

#### Question 6 (15 marks)

- a. Explain in detail term water quality for irrigation. (5 marks)
- b. Explain the methods that you would use to determine the moisture content of soil. (5 marks)
- c. Discuss in detail the various type of irrigations and their setback. (5 marks)

# USDA Textural Triangle

