

UNIVERSITY OF RUHUNA
FACULTY OF FISHERIES AND MARINE SCIENCES & TECHNOLOGY
Academic Year 2022/2023

**Bachelor of Science Honors in Fisheries and Marine Sciences Degree/
Bachelor of Science Honors in Marine and Freshwater Sciences Degree**

Level IV, Semester I - Examination – April / May 2024

LIM 4112: Irrigation

Time: 1 hour and 30 minutes

(Answer **all** questions in Section A and **any two** questions in Section B.)

Section A

1. Determine the Irrigation Demand per unit area for 150 days low-land paddy cultivation.

Key factors to consider:

- Land Preparation will be done in 3 staggers with each taking 15 days.
- Water requirement for Land Preparation is 178mm for 15 days.
- The crop cultivation period is 105 days for paddy in the Yala season.
- Crop Coefficient (K_c) for paddy in Yala Season is given in Table 1-1

Table 1-1

Stage	Initial	Crop Development	Mid-Season	Late Season
Days	20	30	30	25
K_c	1.0	1.15	1.2	0.9

- Farm Loss - 152mm per 31-day month.
- The canals in the area are unlined (The conveyance loss value in the case of an unlined canal is 30%).
- Effective Rainfall, from May to September is 83, 41, 15, 34, and 52 mm respectively.
- Reference Crop Evapotranspiration (ET_o), May to September is 169, 178, 197, 187 and 185 mm respectively.

- Use the following table as the format for calculation, and indicate the steps;

Table 1-2

Month	May	June	July	August	September
	31 days	30 days	31 days	31 days	30 days
ET ₀					
Assuming 3 stagger and a 15 day for each section land preparation (The second stage of land preparation will commence after the completion of the first stage)					
Stagger 1					
Stagger 2					
Stagger 3					
ET (S ₁)					
ET (S ₂)					
ET (S ₃)					
ET _c					
Land Preparation					
Farm Loss					
Field Water Requirement (FWR)					
Effective Rainfall (ER)					
Field Irrigation Requirement (FWR-ER)					
Irrigation Demand					

(40 marks)

Section B

(Answer only two (2) questions)

2. You are an agricultural officer responsible for implementing water management strategies in a dry zone with sandy soil. Your responsibility covers various agricultural areas cultivating fruits, vegetables, and grains. The terrain varies from flat to occasionally sloped. Given these conditions, you have three options for irrigation methods: Drip Irrigation, Sprinkler Irrigation, and Flood Irrigation.

- Select the most suitable irrigation method for the agricultural area and explain the reason for your selection. (10 marks)
- Compare the other two irrigation methods considering factors such as water efficiency, suitability for different crops, environmental impact, and ease of implementation. (10 marks)
- State the key design aspects that require consideration in sprinkler irrigation systems and explain how these factors are utilized in the design process of irrigation systems. (10 marks)

3. As agriculture plays a crucial role in sustaining food security and economic development, understanding the relationship between crops and water is paramount for effective water management in agricultural practices.

- Discuss the crop-water relationship, detailing how crops utilize water throughout their growth stages, including the concept of Permanent Wilting Point and Field Capacity. (10 marks)
- Briefly explain the key factors affecting the water requirement of crops and explain how to determine irrigation frequency. (10 marks)
- Explain the process of conducting an operation study for reservoir management in irrigation systems with particular emphasis on reservoir capacity and maximizing cultivable area. (10 marks)

4. It is important to note that only one percent (1%) of Earth's Water is readily accessible for human use. To manage this precious resource effectively in Sri Lanka, a special water infrastructure plan is essential for responsible water resource management.

- a) Explain the significance of efficient water reuse in Sri Lanka. (05 marks)
- b) Provide an overview of how water is utilized for agricultural purposes in Sri Lanka. (07 marks)
- c) Discuss the environmental and social impacts including potential water reuse failures of the Kotmale Dam project. (08 marks)
- d) Propose strategies for effectively managing water resources in Sri Lanka considering the limitations posed by global water availability constraints. (10 marks)

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LIM 4122:

Question 0

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