UNIVERSITY OF RUHUNA
FACULTY OF AGRICULTURE

SECOND EXAMINATION IN B.Sc GREEN TECHNOLOGY (PART II)
November – 2022
Water Resource Management – EN2203

Structured and Essay Type **Time: 1 and 1/2 hours**

Index Number | |

Answer to the structured question in Part A must be provided in the spaces given.
Answers to essay questions in Part B must be provided in the answer books.
All questions carry equal marks.
Only non-programmable calculators are permitted.
Mobile Phones are not allowed

PART –A (Structured Type) (Compulsory)

a) Using suitable equations and illustrations explain how do you determine when it is time to irrigate.

(10 Marks)

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b) Explain the parameters that you consider to decide how much water to apply in irrigation. (10 Marks)

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c) 3. What are the some of environmental factors that may influence the frequency or duration of irrigation? (10 Marks)

d) Enlist different methods of irrigation with examples. (10 Marks)

e) Enlist factors that should be considered when selecting a proper irrigation system. (10 Marks)

f) Using a suitable graph, explain Four phases of Surface Irrigation Systems (10 Marks).

g) Enlist dominant variables in border irrigation system. (10 marks)

h) Wheat is to be grown in sandy loam soil under border irrigation. Border length and stream size are 120 m and 2 l/s, respectively. Determine the infiltration opportunity time, if irrigation need is 400 m^3/ha .(30 Marks)

PART-B (Essay Type) - Answer Two Questions Only

1. (a). Why irrigation is important in agriculture?

(10 Marks)

(b). How do you describe the irrigation as a green technological approach in agriculture?

(20 Marks)

(c). Briefly explain followings with respect to the irrigation?

i. Critical Moisture Content,
ii. Permanent Wilting Point
iii. Management Allowed Depletion

(15 Marks)

(d). The upper limit of available plant moisture (moisture holding capacity) of a loam soil is 41% (v/v) and the lower limit of plant available moisture is 19% (v/v). The present moisture content is 36% (v/v) and the root zone depth of the existing field crop is 40 cm. For effective use of soil moisture, irrigation is planned to apply when 75% of the plant available moisture is depleted. The average evapotranspiration rate of the crop is 7 mm/day.

i. Determine the time of irrigation (based on present moisture level)
ii. Determine the amount of irrigation water.
iii. If the application efficiency is 80% and the conveyance efficiency is 95%, determine the gross irrigation requirement.

(25 Marks)

(e). What does mean by "Irrigation Scheduling"?

(15 Marks)

(f). What is the soil moisture characteristic curves? Briefly explain how it is used for the irrigation.

(15 Marks)

02. (a) Enlist main four sub systems of a certain irrigation method. (15 marks)

(b) As an irrigation engineer, you are asked to advice regarding irrigation method in a new irrigable farming area. What points will you consider and what steps will you follow to materialize your job? (20 Marks)

(c) Figure 1 depicts a schematic representation of a surface irrigation.

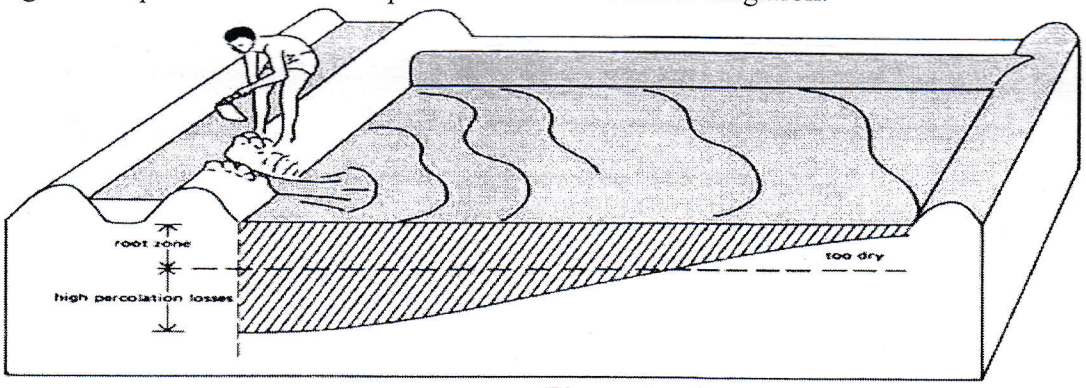

Figure 1

(i) What are the drawbacks that you can observe in the wetting pattern of the above diagram? (10 Marks)

(ii) What are the remedies that you can suggest to bring above scenario into ideal wetting pattern? (10 Marks)

(e) (i) Using a suitable illustration show an ideal wetting pattern of a furrow irrigation system with a clay loam soil. (10 Marks)

(ii) Distinguish the difference between followings; (15 Marks)

- Net irrigation depth and gross irrigation depth
- Irrigation water need and crop water requirement
- Irrigation interval and irrigation period

(f) Irrigation stream of 20 Ls^{-1} is diverted to a plot size 20m X 10 m. The water holding capacity of the soil and the average soil moisture content in the root zone prior to irrigation are 20% and 14% respectively. What would be the irrigation time if the bulk density and the root zone depth are 1.5 gcm^{-3} and 100 cm respectively?

(20 Marks)

03. (i). Describe the purpose of Drainage. (20 Marks)

(ii) Explain the effect of poor drainage on soil and plants. (20 Marks)

(iii)Parallel open drains are to be used to drain out additional water from an agricultural land. Drain bottom is resting on an impervious layer. The operator applies 200 mm irrigation once a week and rainfall is 150 mm per week. The root zone depth is 1m and the impervious layer is 4m below the soil surface. The depth of water level in drains is 2.4m. The hydraulic conductivities of the soil above and below the water level are 0.8m/day and 0.9m/day respectively. Assuming steady state conditions, determine the drain spacing if the drainage coefficient is 25 mm per day.

(60 Marks)

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