

Answer all questions

Time allowed: Three hours

1. The following data were obtained with pressure plate apparatus from two soils (A and B) of unknown texture.

Suction head (cm)	Volumetric wetness (%)	
	Soil A	Soil B
0	44.0	52.0
10	44.0	52.0
20	43.9	52.0
50	38.0	51.0
100	22.5	48.0
300	12.5	32.0
330	12.0	31.0
1,000	7.0	20.0
10,000	5.2	13.5
15,000	5.0	13.0
20,000	5.1	13.0
100,000	4.9	12.8

(Assume the 1000 cm suction head = 1 atm head)

- a. Estimate the followings for each soils;
- Bulk density, assuming that the soils do not swell or shrink and the particle density = 2.65
 - Volume wetness and mass wetness at field capacity and permanent wilting point.
 - Depth of water available to plants per one-meter depth of profile.
- b. What are the likely soil textures of A and B ?

Cont...../2

2.

- a. Briefly describe the limitations of Darcy's law.
- b. Describe the factors, which affect the hydraulic conductivity of a soil.
- c. A sample of sand 5 cm in diameter and 10 cm thickness was subjected to a permeability test. The test lasted 20 seconds under the constant hydraulic head of 100 cm. The weight of the collected discharged water was 600 gm. Determine the hydraulic conductivity of the soil sample in cm/sec.

3.

- a. What are the advantages and disadvantages of surface irrigation methods?
- b. Define the term 'Opportunity time' in a border irrigation system.
- c. List the measures that could be adopted to reduce runoff losses in a border irrigation system.
- d. Discuss the importance of using a cut – back system in furrow irrigation.

4. **Critically discuss the following statements;**

- a. The critical point of soil moisture availability for a plant is the level below which the moisture content is not allowed to drop.
- b. To achieve high distribution uniformity in a border irrigation system, the regression curve should lie above the irrigation curve, but as close to it as possible.
- c. The sub-surface irrigation system can be applicable only for certain conditions.
- d. In fertigation technique, fertilizer application should be completed within 70 – 80 % of the total duration of irrigation.
- e. In a sprinkler irrigation system, larger droplets fall near the boundary of wetting pattern and finer droplets fall near the sprinkler.

5.

- a. What are the factors, which determine the water quality.
- b. Briefly describe the basic field conditions which determine the suitability of irrigation water.
- c. List the factors that modify the compositions of river water.
- d. Briefly discuss the precautions should be made to maintain the water quality in Sri Lanka.

Cont.../3

6.

- a. List the steps involved in the determination of irrigation requirement of a field.
- b. An area 15-hectare of vegetables in the Eastern region is to be irrigated by a pump working 6 hours a day. The available soil moisture is 126 mm/m and the depth of root zone is 1 m. Irrigation is to be done when 50 % of the soil moisture is depleted. If water application efficiency is 60 % and the consumptive use of vegetable is 9 mm/day, determine the following;
 - i. Depth of water to be applied per application
 - ii. Irrigation interval
 - iii. Quantity of water to be applied per application
 - iv. Required capacity of pump in lit/sec.
