



- Answer all the following questions.
- Illustrate your answers with sketches when necessary.
- The exam consists of 2 pages.
- No. of Questions: 4
- Total Mark: 100 Marks

**Question (1) (25 Marks)**

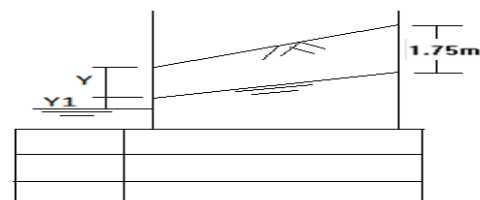
(A) State True or False & Correct the False

(15 Marks)

No	The Statement
1	Hygroscopic water is useful for the plant.
2	Capillary water is useful for the plant.
3	Excess water in the soil is the moisture above W.P.
4	Irrigation efficiency increases by giving less quantities of water with short periods between irrigation processes.
5	Irrigation rotations increase the irrigation efficiency.
6	Two-turn irrigation rotation must be used when cotton is cultivated.
7	Sharaki is not suitable for two-turn irrigation rotation.
8	Two partial regulators are required for two-turn irrigation rotation.
9	Sprinkler irrigation system is sensitive for clogging.
10	Drip irrigation system needs high operating pressure.

(B)

1. State and draw the forms of water in the soil? (4 Marks)
2. *In the figure:* is it a canal or a drain? (2 Marks)
3. What is the minimum value for Y? (2 Marks)
4. What is the required value for Y1? (2 Marks)



**Question (2) (5\*4 = 20 Marks)**

A branch canal has a length of 15 km, serves an area of 16,200 Feddan, and feeds 3 distributary canals. The land is cultivated as 40% cotton and 55% Sharaki. *The data are in the following table:*

Distributary Canal	Location (L: Left)	Area Served (Feddan)	Land Levels for Distributary Canals at Km:				
			0.0	1.0	2.0	3.0	4.0
C 1	2.0, L	5000	(12.00)	(11.95)	(11.90)/(10.90)	(10.80)	(10.70)
C 2	6.0, L	5000	(11.60)	(11.55)	(11.50)	(11.45)	---
C 3	10.0, L	3700	(11.40)	(11.20)	(11.00)	(10.80)	---

1. For a suitable irrigation rotation, sketch a plan for the branch canal and its distributary canals showing the required constructions?
2. Draw the synoptic diagram for the distributary canal C1 for lift irrigation?
3. Fix the water level in the branch drain at the point receiving water from C1?
4. Calculate the area served for design at different sections of the branch canal, (compensation ratio = 30%)?
5. Determine the discharge at km 12.0 of the branch canal (F.W.D. = 50 m<sup>3</sup>/Fed/day)?

**Question (3) (5\*4 = 20 Marks)**

1. Design the cross section at km 7.0 of a branch drain at Upper Egypt, (A.S. = 20,000 Feddan, F.W.D. = 50 m<sup>3</sup>/Fed/day, i = 20 cm/km, Z=1.5 & b = 2y)?
2. Find the velocity at km 7.0 of the branch drain?
3. Comment on this value of the velocity?
4. Draw a typical cross section of the branch drain at km 7.0 (W.L. = (10.30) & L.L. = (12.00))?
5. Determine the quantities of cut and fill at km 7.0 for the branch drain?

**Question (4) (35 Marks)**

(A) State the suitable structures for the following cases:

(4\*2 = 8 Marks)

1. Figure 1?
2. Figure 2?
3. Intersection of a branch canal and a main drain?
4. Intersection of a branch drain and a main canal?

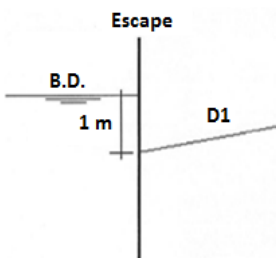


Figure 1

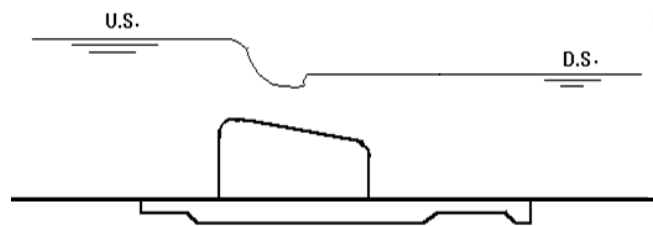
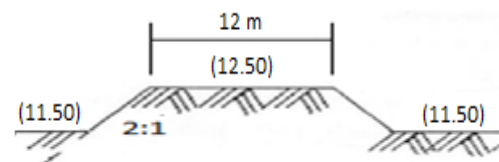
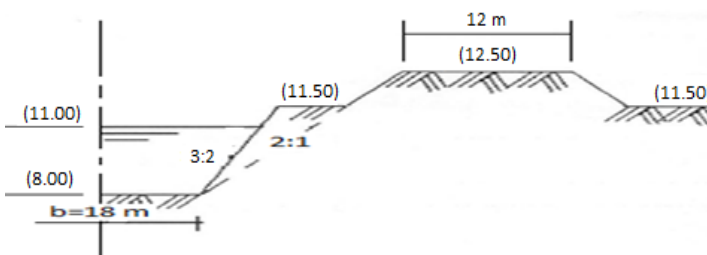


Figure 2

(B) For the canal and the road shown in the figures, the water slope is 8 cm/km, the roughness coefficient is 0.025 and the road width over the bridge is 9 m with 2 footpaths, each of 1.5 m.



1. Design R.C. bridge, where heading up is not to exceed 5 cm? (10 Marks)
2. Design R.C. Box culvert, where heading up is not to exceed 10 cm? (10 Marks)
3. Draw a sectional elevation for the R.C. Box culvert? (7 Marks)