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Water Logging and Lining of Canal

Q.1 A land is known as water-logged when
- (a) the pH of the soil reaches a value of 8.5.
- (b) the soil in the root zone has high salinity.
- (c) the soil pores in the root zone are saturated with water.
- (d) there is water flowing on the surface of the land.

Q.2 Study the following statements:
- (i) a land is called water logged when capillary fringe reaches the root zone of the plants.
- (ii) lining of irrigation channel decreases the water logged area.
- (iii) Lift irrigation increases water logging.

The correct statement/s is/are:
- (a) both (i) and (ii)
- (b) both (i) and (iii)
- (c) only (ii)
- (d) (i), (ii) and (iii)

Q.3 Which of the following are remedial measures for water logging?
1. Lining of canals
2. Conjunctive use of water
3. Subsurface drainage
4. Contour banding
- (a) 1 and 3
- (b) 1, 2 and 3
- (c) 2 and 3
- (d) 1, 2, 3 and 4

Q.4 Steel reinforcement in concrete lining is justified, mainly because
- (a) it augments the structural strength of uncracked lining.
- (b) it enables the lining to take tensile loads.
- (c) it reduces the width of shrinkage cracks.
- (d) None of the above.

Q.5 A commonly used shape for lined canals is a triangular section with its corner rounded off by a radius equal to the full supply depth. For such a channel with a side slope of 1.5 horizontal : 1 vertical, the hydraulic radius at full supply depth y_0 is
- (a) $y_0/2$
- (b) y_0
- (c) $2y_0/3$
- (d) $0.416\,y_0$

Q.6 A lined alluvial canal is best designed on the basis of
- (a) Lacey's formula
- (b) Kennedy's formula
- (c) Manning's formula
- (d) Continuity equation

Q.7 A triangular lined canal section with corners rounded off by a radius equal to the full supply depth of 4 m, is likely to have its hydraulic radius, as
- (a) 4 m
- (b) 3 m
- (c) 2 m
- (d) Cannot be ascertained, as side slopes are not given.

Q.8 When elaborate under-drainage arrangements can not be provided, and the soil strata is sandy, the preferred material for canal lining, would be
- (a) cement concrete lining
- (b) soil cement lining
- (c) brick lining
- (d) shotcrete lining

Q.9 In the alignment of an irrigation channel where from offtakes have to be provided at regular intervals, changes in the given channel parameters are made use of. The correct sequence of the decreasing order of preference of these parameters is
- (a) width, slope, depth
- (b) width, depth, slope
- (c) depth, slope, width
- (d) depth, width, slope

Q.10 Consider the following statements.
1. Bentonite layer lining in an irrigation canal reduces seepage loss.
2. Bentonite has very less permeability.
The correct statements is/are.
- (a) Only 1
- (b) Only 2
- (c) 1 and 2
- (d) None of these

Q.11 Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I
- A. Natural system
- B. Grid iron system
- C. Herring bone system
- D. Intercepting tile drains

List-II
1. Submain in depression
2. Rolling topography
3. Source on hilly area
4. Levelled terrain

Codes:

	A	B	C	D
(a)	4	2	1	3
(b)	1	2	3	4
(c)	3	4	2	1
(d)	2	4	1	3

Q.12 Due to water logging, the salt contents rise and soil becomes infertile when pH value becomes
- (a) 5
- (b) 7
- (c) 9
- (d) 11

Q.13 A triangular irrigation lined canal carries a discharge of 25 m^3/s at bed slope of 1/6000. If the side slopes of the canal are 1 : 1 and Manning's coefficient is 0.018, the central depth of flow is equal to
- (a) 1.98 m
- (b) 2.98 m
- (c) 3.62 m
- (d) 5.62 m

Q.14 The leaching requirement of a soil is 10%. If the consumptive use requirement of the crop is 90 mm, then the depth of water required to be applied to the field is
- (a) 80 mm
- (b) 90 mm
- (c) 100 mm
- (d) 110 mm

Q.15 Which of the following statement(s) is/are correct?
1. Limestone is used as a soil amendment to reclaim alkaline soils.
2. Addition of limestone reduces acidity of soils.
- (a) Only 1
- (b) Only 2
- (c) 1 and 2
- (d) None of the above

Q.16 An irrigation canal is lined along its 20 m perimeter @ Rs. 40 per m^2 of lining. The lining has resulted in net water saving @ 3 cumecs per M-m² of lined area, whereas each cumecs of water increases the annual crop yield by Rs. 4 lakh. Assuming the life of lining as 40 years, and the saving in maintenance cost to be balanced by the interest on investment. the benefit cost ratio for the project is
- (a) 1.2
- (b) 1.0
- (c) 0.83
- (d) None of them

Q.17 A standard triangular linked channel section with 1.5 H : 1 V side slopes has a capacity of 26 cumecs and full supply depth of 2.5 m. The lining material for the channel would be safe to withstanding mean velocity of
- (a) 1.8 m/s
- (b) 2.0 m/s
- (c) 2.2 m/s
- (d) None of those

Q.18 Which of the following is true about Asphaltic concrete lining?
1. Fairly cheap
2. Flexible and readily conforms to subgrade
3. Reduces of weed growth
4. Decreases the rugosity coefficient to increase channel efficiency
- (a) 1 and 3
- (b) 1 and 3
- (c) 1 2, and 3
- (d) 1 and 4

Q.19 Which of the following statement(s) is/are correct?
1. Spacing of tile drains is dependent on the size of drain.

2. The design flow per unit length of the drain depend on the infiltration discharge in the ground which should be removed by the drain.
   - (a) Only 1
   - (b) Only 2
   - (c) 1 and 2
   - (d) None of these

Q.20 Assertion (A): Barseem is preferably sown in a recently reclaimed alkaline soil.
   Reason (R): Barseem is a type of salt resistant crop.
   - (a) both A and R are true and R is the correct explanation of A
   - (b) both A and R are true but R is not a correct explanation of A
   - (c) A is true but R is false
   - (d) A is false but R is true

Q.21 Assertion (A): Lined canals are more economical than unlined canals.
   Reason (R): Seepage losses are minimized in lined canals.
   - (a) both A and R are true and R is the correct explanation of A
   - (b) both A and R are true but R is not a correct explanation of A
   - (c) A is true but R is false
   - (d) A is false but R is true

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Answers   Water Logging and Lining of Canal

1. (c)	2. (a)	3. (b)	4. (c)	5. (a)	6. (c)	7. (c)	8. (c)	9. (c)	10. (c)
11. (d)	12. (c)	13. (c)	14. (c)	15. (b)	16. (a)	17. (c)	18. (b)	19. (b)	20. (a)
21. (d)									

Explanations   Water Logging and Lining of Canal

1. **(c)**
   An agricultural land is said to be water logged when root zone of the plants gets flooded with water & thus become ill-aerated.

5. **(a)**
   Area of section $= y_0^2(\theta + \cot\theta)$
   Perimeter of section
   $= 2y_0(\theta + \cot\theta)$
   ∴ Hydraulic depth
   $$= \frac{\text{Area}}{\text{Perimeter}}$$
   $$= \frac{y_0^2(\theta + \cot\theta)}{2y_0(\theta + \cot\theta)} = \frac{y_0}{2}$$

7. **(c)**
   Hydraulic Radius/Hydraulic Mean depth
   $$= \left(\frac{y_0}{2}\right)$$
   $$\Rightarrow \quad \frac{d}{2} = 2 \text{ metre}$$

9. **(c)**
   The best alignment of off-taking channel is that in which the off-taking channel makes zero angle with the parent channel initially and then separates out in transition. The depth of water should always be such that off take channel runs full. The transitions should be properly designed, so as to avoid accumulation of silt. The transition can also be used as metering flume. Thus depth, slope and width will be the correct order of preference of parameters.

12. **(c)**

S.No.	Classification	pH value
1.	Saline soil or white alkali	≥ 8.5
2.	Alkaline soil or non-saline alkali or sodic soil or black alkali	$8.5 - 10.0$
3.	Saline-alkali soil	< 8.5

Hence option (c) is correct.

13. **(c)**
   $$A = y_0^2 (\theta + \cot\theta)$$
   where $\theta = 45° = \pi/4$ $\quad (\because H:V = 1:1)$
   $$= \left(\frac{\pi}{4} + 1\right) y_0^2$$
   $$Q = \frac{A}{n} R^{2/3} \sqrt{s} \text{ where } R = y_0/2$$
   $$\Rightarrow \quad 25 = \frac{\left(\frac{\pi}{4}+1\right) y_0^2}{0.018} \frac{y_0^{2/3}}{2^{2/3}} \sqrt{\frac{1}{6000}}$$
   $$\Rightarrow \quad y_0 = 3.624 \text{ m}$$
   Hence option (c) is correct.

14. **(c)**
   Leaching requirement in %
   $$= \frac{D_i - C_u}{D_i} \times 100$$
   Where,
   D_i = Total irrigation water depth to be applied
   C_u = consumptive use
   $$10 = \frac{D_i - 90}{D_i} \times 100 \times 100$$
   $$D_i = 100 \text{ mm}$$

19. **(b)**
   Spacing of the drains is independent of size of drain
   $$\text{Spacing, } S = \frac{4k(b^2 - a^2)}{Q_0}$$

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