

B.Tech 8th Semester Exam., 2018

IRRIGATION ENGINEERING

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following
(any seven) : 2×7=14

- (a) The difference in level between the top of a bank and supply level in a canal is called
 - (i) berm
 - (ii) free board
 - (iii) height of bank
 - (iv) None of the above

- (b) The measure to remove waterlogging of land is
 - (i) to reduce percolation from canals and water courses
 - (ii) to increase outflow from the ground-water reservoir
 - (iii) Both (i) and (ii)
 - (iv) Neither (i) nor (ii)

- (c) Attracting groynes are built
 - (i) perpendicular to the bank
 - (ii) inclined downstream
 - (iii) inclined upstream
 - (iv) None of the above

- (d) In a canal syphon, the flow is
 - (i) under atmospheric pressure
 - (ii) pipe flow
 - (iii) with critical velocity
 - (iv) under negative pressure

- (e) A waterlogged land is found suitable for cultivation due to
- ease of tillage for preparation of the field for optimum condition of germination
 - absence of aeration of soil from root zone of the plant
 - regular supply of water to plants from the water table by capillary action
 - None of the above
- (f) For smooth entry of water in a canal, the angle between head regulator and water is generally kept
- 80°
 - 90°
 - 110°
 - 120°
- (g) In a Sarda-type fall, the rectangular crest may be used for discharge upto
- 10 cumecs
 - 14 cumecs
 - 20 cumecs
 - 25 cumecs

- (h) When a canal is carried over a natural drainage, the structure provided is known as
- syphon
 - aqueduct
 - superpassage
 - syphon-aqueduct
- (i) The top of the capillary zone
- lies below the water table at every point
 - lies above the water table at every point
 - coincides the water table at every point
 - None of the above
- (j) For the design of major hydraulic structures on the canals, the method generally preferred to is based on
- Bligh's theory
 - electrical analogy method
 - the relaxation method
 - Khosla's method of independent variables

2. (a) Differentiate between initial regime and final regime. 6

(b) A water course has CCA of 1200 ha. The intensity of irrigation for crop A is 40% and for crop B is 35%, both the crops being Rabi crops. Crop A has k or period of 20 days and crop B has k or period of 15 days. Calculate the discharge of water course, if k or depth for crop A is 10 cm and for crop B is 16 cm. 8

3. (a) What is runoff? What are the factors affecting runoff and methods of calculation of runoff? 7

(b) Derive an expression for discharge for a well fully penetrating a confined aquifer. 7

4. (a) Describe various zones of underground water. Explain the terms 'aquifer', 'aquiclude' and 'aquifuge'. 7

(b) Find the delta for the crop when its duty is 864 hectares/cumec on the final base period of this crop is 125 days. 7

5. An artesian well has a diameter of 20 cm. The thickness of aquifer is 30 cm and its permeability is 38 m/day. Find its yield under a draw-down of 4 m at the well face. Use radius of influence as recommended by Schardt. 14

6. Write a short note on 'synthetic unit hydrograph'. How will you derive the synthetic unit hydrograph from a number of unit hydrographs? Illustrate the method with suitable example. 14

7. After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop?

- field capacity of the soil = 25%
- permanent wilting point = 13%
- dry density of the soil = 1.5 g/cc
- effective depth of root zone = 75 cm
- dry density of the soil = 1.5 g/cc
- field capacity of the soil = 25%
- permanent wilting point = 13%

8. (a) Explain the different types of irrigation efficiencies in detail.
- (b) Explain the terms 'cash crop' and 'crop ratio'.
9. Using Lacey's theory, design an irrigation channel carrying $40 \text{ m}^3/\text{sec}$. Take silt factor as 1.1.
