

**B.Tech 8th Semester Exam., 2019**

**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 value of Sodium Absorption Ratio for high sodium water lies between

- (i) 0 to 10
- (ii) 10 to 18
- (iii) 18 to 26
- (iv) 26 to 34

(b) The Kor depth for rice is 190 mm and Kor period is 14 days. The outlet factor for this will be

- (i) ~~(a)~~ 637 ha/m<sup>3</sup>/sec
- (ii) 837 ha/m<sup>3</sup>/sec
- (iii) 972 ha/m<sup>3</sup>/sec
- (iv) 612 ha/m<sup>3</sup>/sec

(c) The water utilizable by plants is available in soils mainly in the form of

- (i) gravity water
- (ii) ~~(a)~~ capillary water
- (iii) hygroscopic water
- (iv) hygroscopic water

(d) The maximum application rate by sprinklers is limited by

- (i) infiltration capacity of soil
- (ii) ~~(a)~~ prevailing wind velocity
- (iii) quantity of water available
- (iv) prevailing humidity and radiation

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- (c) The moisture tension for a soil is 8 atmosphere. The soil is then at
- ☒ (i) permanent wilting point
  - ☐ (ii) field capacity
  - ☐ (iii) optimum moisture content
  - ☐ (iv) equivalent moisture
- (f) Consumptive use refers to the loss of water as a result of
- ☒ (i) evaporation and transpiration
  - ☐ (ii) crop water requirement
  - ☐ (iii) evaporation and infiltration
  - ☐ (iv) evaporation and transpiration from the cropped area
- (g) Acidic soil are reclaimed by
- ☐ (i) leaching of soil
  - ☐ (ii) using limestone as a soil amendment
  - ☒ (iii) using gypsum as a soil amendment
  - ☐ (iv) provision of drainage

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- (h) For medium silt whose average grain size is 0.016 cm, Lacey's silt factor is likely to be
- ☐ (i) 0.30
  - ☐ (ii) 0.45
  - ☒ (iii) 0.704
  - ☐ (iv) 1.32
- (i) Balanced depth of cutting of canal is
- ☐ (i) half the total depth of canal
  - ☐ (ii) half of full supply depth
  - ☐ (iii) the maximum cut that an excavator can take <http://www.akubihar.com>
  - ☐ (iv) where volume of cutting is equal to volume of filling
- (j) What is the regime scour depth for a channel in soil with silt factor unity and carrying  $8 \text{ m}^3/\text{s}$  of discharge intensity in accordance with Lacey's regime theory?
- ☐ (i) 3.6 m
  - ☐ (ii) 4 m
  - ☐ (iii) 5.4 m
  - ☐ (iv) 25.6 m

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2. (a) Define irrigation. State the points to be considered while recommending the necessity of irrigation. 7
- (b) What are different types of sprinkler method of distribution of water? Describe briefly with a neat sketch. 7
3. (a) State the advantages and disadvantages of irrigation. 7
- (b) Differentiate between lift and flow irrigation. 7
4. (a) Define base period, delta and duty and establish a relation between them. 7
- (b) A channel is to be designed for irrigating 5000 hectares in Kharif crop and 4000 hectares in Rabi crop. The water requirement for Kharif and Rabi are 60 cm and 25 cm respectively. The Khar period for Kharif is 3 weeks and for Rabi is 4 weeks. Determine the discharge of channel for which it is to be designed. 7
5. Define gross command area and culturable command area. The gross command area of an irrigation project is 1 lakh hectares. The culturable command area is 75% of OCA.

- The intensities of irrigation for Kharif and Rabi are 50% and 55% respectively. If the duties for Kharif and Rabi are 1200 hectares/cumec and 1400 hectares/cumec respectively, determine the discharge at the head of the canal considering 20% provisions for transmission loss, overlap allowance, evaporation loss, etc. 14
6. (a) What is meant by frequency of irrigation? Why is the frequency of irrigation ascertained for? 7
- (b) What are different types of irrigation efficiency? 7
7. What do you understand by regime channel? Explain the initial regime and final regime of a channel. Using Lacey's theory, design an irrigation channel for the following data : 14
- (a) Discharge,  $Q = 60$  cumec  
Lacey's silt factor,  $f = 1.0$   
Trapezoidal section side-slope =  $\frac{1}{2} (H) : 1 (V)$
8. Design a concrete lined channel of triangular section to carry a discharge of 55 cumec at a slope of 1 in 10000. The side slope of the channel are 1.25 (H) : 1 (V) and Manning's  $N$  may be taken as 0.018. 14

9. (a) Write short notes on (any two) :  $3\frac{1}{2} \times 2 = 7$

(i) Well shrouding and well development

(ii) Types of open well

(iii) Infiltration galleries

(b) Describe the relative merits and demerits of well irrigation and the canal irrigation.

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