

Code : 011852

B.Tech. 8th Semester Exam., 2017

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) Questions No. 1 is compulsory.

1. Answer any seven questions from the following: 14

- i) Crop period is defined as
  - (a) Time between sowing and harvesting
  - (b) Growth period
  - (c) Time between the first watering at the time of sowing and last watering before harvesting
  - (d) None of these
- ii) Duty at the head of the field to be irrigated is called as the
  - (a) Gross quantity

P.T.O.

- (b) Lateral quantity
- (c) Outlet discharge factor
- (d) Net quantity

iii) Kharif food crops are

- (a) Cotton
- (b) Groundnut
- (c) Maize
- (d) Sesame

iv) Which of the following crop rotations are correct?

- (a) Gram-rice
- (b) Wheat-gram-jwar
- (c) Jwar-gram-cotton
- (d) Cotton-wheat-gram or sugar cane

v) Based on the function of the canal, the canal is classified as

- (a) irrigation canal
- (b) alluvial canal
- (c) main canal
- (d) permanent canal

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vi) Following is not the row crop

- (a) Cotton
- (b) Jwar
- (c) Groundnut
- (d) Wheat

vii) Based on discharge, a canal is classified as

- (a) side slope canal
- (b) Watershed canal
- (c) main canal
- (d) rigid boundary canal

viii) Read the following statements regarding sprinkler irrigation and select the incorrect statement.

- (a) It is used for row crops, orchards and pastures etc.
- (b) It is used for saving water
- (c) It is used for more uniform distribution of water.
- (d) It is used so that yield may decrease.

ix) The crops which cannot be consumed directly by the farmers are called as

- (a) Food crops
- (b) Non-food crops or cash crops

(c) Rabi crops

(d) None of these

x) The value of Manning's n for unlined channels in very good condition is

- (a) 0.03
- (b) 0.0225
- (c) 0.025
- (d) 0.0275

2. (a) Define : Crop rotation; Root zone depth; Kor period and Kor watering. 6

(b) Find out frequency of irrigation for a crop grown on clay-loam soil where ground water table is far below the root zone. Use following data: Depth of root zone=1.5 m, Field capacity=25%, Permanent wilting point = 13%, Daily consumptive use= 15 mm, dry density of soil = 1.5 g/cm<sup>3</sup>. Only 60% of available soil moisture is to be depleted.

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3. (a) Distinguish between the following: 6

- (i) Contour canal and side slope canal
- (ii) Minor and water course

(iii) Productive and protective irrigation works

(iv) Inundation and perennial canals

(b) A field channel has a culturable command area of 2000 hectares. The intensity of irrigation for gram is 30% and for wheat is 50%. Gram has a crop period of 18 days and kor depth of 12 cm, while wheat has a kor period of 15 days and a kor depth of 15 cm. Calculate the discharge of the field channel. 8

4. Design an irrigation channel by Lacey's theory having FSD = 5 cumec, silt factor = 1 and side slope 0.5H:IV. 14

5. A stream of 120 lit/s was diverted from a canal and 100 lit/s were delivered to the field. An area of 1.7 hectares was irrigated in 8 hrs. Effective depth of root zone was 1.8 m. The runoff loss in the field was 400 cumec. The depth of water penetration varied linearly from 1.8 m at the head end of the field to 1.4 m at the tail end. Available moisture holding capacity of the soil is 20 cm per metre depth of soil. Determine water conveyance, water application, water storage and water distribution efficiencies. The irrigation was started at a moisture extraction level of 50% of the available moisture. 14

6. (a) Define: Depression head; Circle of influence; Specific yield of a well and Collector well. 6

(b) Estimate discharge of a tube well of 20 cm diameter, GL + 216 m, GWT + 211 m, Top of aquifer + 212 m, bottom of aquifer and well + 196 m. Permeability of aquifer soil is 25 m/day, safe drawdown 5 m and radius of influence 300 m. 8

7. (a) Explain what is meant by conjunctive use of surface and ground water. 6

(b) What is waterlogging? Describe various methods adopted as anti-waterlogging measures. 8

8. (a) Distinguish between the following: 6

(i) Flashy river and virgin river

(ii) Aggrading river and degrading river

(iii) Meander and cutoff

(iv) Embankment and a groyne

(b) What is a guide bank? Draw a good sketch of a guide bank and explain its different parts. 8

9. Write notes on any three of the following:

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- (a) Crop rotation
- (b) Balancing depth
- (c) Regime of channel
- (d) Silt ejector

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