53 (CE 716) IREN

2018

IRRIGATION ENGG

Paper : CE 716

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. (a) Define Irrigation. What is the necessity of irrigation ? Explain the various considerations taken into account in the selection of an irrigation system.

   10

(b) With the help of diagram, explain briefly various components and functions of canal. 10

2. *(a)* During a certain point of growth of a crop, consumptive use of water is $3mm/day$. Determine the interval in days between irrigation and the depth of water to be applied when the amount of water available in the soil is 60% of the maximum depth of available water in the root zone which is $90mm$. Assume irrigation efficiency to be 70%.

6

(b) What is the water requirement of crops? What is the meaning of the terms Duty and Delta in connection with crop water requirement? Derive the relation between duty and delta.

· 12

(c) Find the time required to cover an area of 0·1 hectares when a tubewell is discharging at the rate of 0·03 *cumecs*, average infiltration rate for soil may be taken as 5*cm/hr* and average depth of flow on the field as 7·5*cm*.   2

3. (a) What are the various types of lining that can be used in case of Indian Canal?   10

(b) Discuss the salient features of Kennedy's theory for the design of earth canals based on the critical velocity concept and mention its limitations. Explain how Lacey's theory is an improvement over Kennedy's theory.

    3+3+4

4. (a) Design an irrigation canal with the following data : Discharge of the canal = 15 *cumecs*, permissible velocity = 0·69*m/s*, bed slope = 1 in 4500, side slope 1 : 1, Chezy's constant $C = 40$, Rugosity coefficient = 0·0225.

    8

(b) Given Table : 1 shows the details for a certain crops. Using Blaney-Criddle equation and a crop factor $k = 0.75$, determine the following

    (i) Consumptive use

    (ii) Net irrigation requirement

    (iii) Field irrigation requirement if water application efficiency is 70%.

          8

Table : 1

Month	Mean monthly temp (°C)	Monthly % of day time hours of the year	Useful rainfall (cm)
Jun	35	7·90	7·5
July	30	10·20	10·8
Aug	28	9·60	13·0
Sept	25	8·40	11·5
Oct	15	7·86	10·5
Nov	19	7·19	00
Dec	14	7·15	1·2
Jan	12·5	7·30	0·8
Feb	13	7·03	00

(c) Explain in brief the necessity of irrigation in India. 4

5. (a) The left branch canal carrying a discharge of 20 *cumecs* has culturable commanded area of 20,000 hectares. The intensity of Rabi crops is 80% and the base period is 120 days. The right branch canal carrying discharge of 8 *cumecs* has culturable commanded area of 12,000 hectares, intensity of irrigation of Rabi crop is 50% and the base period is 120 days. Compare the efficiencies of the two canal system.

6

(b) Write a note on canal alignment.

6

(c) What is waterlogging? What are the causes of waterlogging and describe the various methods adopted as anti-waterlogging measures?

8

6. (a) Compare surface irrigation and sub-surface irrigation. 6

(b) Explain the design features of cross drainage works. 14

(c) Explain in brief the necessity of irrigation in India.   4

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(b) Write a note on canal alignment.   6

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6. (a) Compare surface irrigation and sub-surface irrigation.   6

(b) Explain the design features of cross drainage works.   14