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Question Paper Code : X10251

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Sixth Semester
Civil Engineering
CE 8603 – IRRIGATION ENGINEERING
(Regulations 2017)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. What is duty ? Write down the relationship between duty, delta and base period of crop.

2. What is evapotranspiration ? Enlist different methods used for estimation of evapotranspiration on climatological approach.

3. What are different types of drippers ?

4. Enlist different structures used for on-farm water distribution.

5. What are different diversion head works ?

6. Enlist different forces action on gravity dam.

7. Enlist different types of canal falls or drops.

8. Classify the different materials used for canal lining.

9. What is meant by cut-off rate ?

10. What are different numerical methods of optimization ?

PART – B   (5×13=65 Marks)

11. a) Enlist and explain principal methods for direct measurement of evapotranspiration.   (13)

(OR)

    b) Write down about historical development of irrigation from Medieval India to current situation in brief.   (13)

12. a) Determine the size of sprinkler nozzle, diameter of lateral and main line and size of pump required using following data :

    i) Length of lateral = 84 m

    ii) Distance between laterals along the main = 18 m

    iii) Application rate = 12 mm/hr

    iv) Length of main = 72 m

    v) Maximum head required at the main to operate sprinkler (Hn) = 30 m

    vi) Elevation difference between pump and junction of lateral (Hj) = 2 m

    vii) Maximum elevation difference between main and last sprinkler on lateral (He) = 2.2 m, on uphill slope.

    viii) Elevation difference between pump and water supply after draw down = 3.5 m

    ix) Scobey's coefficient, Ks = 0.32

    Assume, pressure variation in lateral as 20 percent

    Coefficient of discharge (Cd) = 0.96

    Sprinkler spacing as 12 m **(13)**

(OR)

   b) A stream of 120 litres per second was diverted from a canal and 100 litres per second were delivered to the field. An area of 1.6 hectares was irrigated in 8 hours. The effective depth of root zone was 1.7 m. The runoff loss in the field was 420 m^3. The depth of water penetration varied linearly from 1.7 m at the head end of the field to 1.1 m at the tail end. Available moisture holding capacity of the soil is 20 cm per metre depth of soil. It is required to determine the water conveyance efficiency, water application efficiency, water storage efficiency and water distribution efficiency. Irrigation was started at moisture extraction level of 50% of the available moisture. **(13)**

13. a) Enlist and explain different types of earthen dams based on the use of construction method. **(13)**

(OR)

   b) What are different galleries present in the dam ? Describe them with their functions. **(13)**

14. a) Design a concrete lined channel to carry a discharge of 350 cumecs at a slope of 1 in 5000. The side slopes of the channel may be taken as 1.25 : 1. The value of n for lining is 0.014. Assume limiting velocity in the channel as 2 m/sec. **(13)**

(OR)

   b) Give the brief classification of canal outlets or modules. Design an irrigation outlet for the following data : **(13)**

FSQ of outlet	=	50 lit/sec.
FSL in distributary on u/s side of outlet	=	200.00 m
FSL in water course on d/s side of outlet	=	199.92 m
FSD in distributary on u/s side of outlet	=	1.05 m

15. a) State the main objectives and necessity of participatory irrigation management (PIM). **(13)**

(OR)

b) What are different on farm development (OFD) works ? Describe the general approach to design and execute on farm development works. **(13)**

PART – C   **(1×15=15 Marks)**

16. a) The data obtained from a test furrow in a sandy loam soil are given as follow :

Stream size lit./min.	Distance, m	Advance time, min.	Wetted perimeter, cm	Furrow cross sectional area corresponding to depth of flow, cm^2
92.00	20	1.75	25.39	60.00
	40	5.75	25.82	93.00
	60	10.91	26.39	103.00
	80	17.83	26.70	108.40
	100	23.67	27.11	111.65
	110	27.75	27.42	112.28

Compute the furrow infiltration. **(15)**

(OR)

b) Design an irrigation channel to carry 40 cumecs of discharge, with B/D, that is base width to depth ratio as 2.5. The critical velocity ratio is 1.0. Assume a suitable value of Kutter's rugosity coefficient and use Kennedy's method. **(15)**

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