Dec-25-0277

CE-703 (Irrigation and Design of Hydraulic Structures)

B.Tech. 7th (CBCS)

Time : 3 Hours   Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, select one question each from sections A, B, C and D. Section E is compulsory.

SECTION - A

1. 'All the waters are not fit for irrigation crops'. Discuss briefly and critically analyze the above statement.   (10)

2. Determine the time required to irrigate a strip of land of 0.04 hectares in area from a tube well with a discharge of 0.02 cumec. The infiltration capacity of the soil may be taken as 5 cm/hr, and the average depth of flow on the field as 10 cm.   (10)

SECTION - B

3. Name any two methods used for estimating consumptive use of water for a particular crop at a particular place. Explain in detail the one which is most widely used in your region, and the reason for preferring that particular method.   (10)

4. During a particular stage of the growth of a crop, consumptive use of water is 2.5 mm/day. Determine the interval in days between irrigations, and the depth of water to be applied when the amount of water available in the soils is 50% of the maximum depth of available water in the root zone, which is 80 mm. Assume irrigation efficiency to be 60%.   (10)

SECTION - C

5. (a) What is meant by the term low dam? Determine the dimensions of the elementary profile of a low gravity dam.   (5)

(b) What are the methods adopted to reduce uplift in masonry dams?   (5)

6. A concrete dam can be assumed to be a trapezoidal in section having a top width of 2 m and bottom width of 10 m. Its height is 12 m and the upstream face has a batter of 1 : 10. Give an analysis of the stability of the dam for the base section for overturning and sliding in the full reservoir condition assuming no free board allowance but allowing for uplift pressures. Assume uplift intensity factor as 100%. Also determine the compressive stresses at the toe and the heel, and major principle and shear stress developed at the toe. Assume weight of concrete to be 24 kN/m³, and the shear strength of concrete to be 1400 kN/m³, and the coefficient of friction between concrete and foundation soil be 0.7.   (10)

SECTION - D

7. (a) What is meant by Intake weir and how does it differ from a surplus weir?   (5)

(b) What are under sluices, and what are their functions in a river regulator?   (5)

8. Design a 1.5 metres Sarda type fall for a canal having a discharge of 12 cumecs, with the following data:

Bed level upstream   = 103.0 m

Side slopes of channel   = 1:1 m

Bed level downstream   = 101.5 m

Full supply level upstream   = 104.5 m

Bed width u/s and d/s   = 1.0 m

Soil   = Good loam

Assume Bligh's Coefficient   = 6

                                                              (10)

SECTION - E (Compulsory)

9. Answer the following questions in brief:

(a) What do you mean by "check flooding"?

(b) Write a brief note on 'boron concentration in irrigation waters'.

(c) Describe the 'Optimum utilization of irrigation water'.

(d) Classify the saline and alkaline soils.

(e) What do understand by cash crops and crop ration?

(f) Explain the term 'Kor water depth'.

(g) Differentiate between river regulator and canal regulator.

(h) Explain surplus weir and storage weir.

(i) Purpose of gravity and non-gravity weirs.

(j) Describe trapezoidal fall.

(10×2=20)