Code: 20CE3405

II B.Tech - II Semester – Regular Examinations – JULY 2022

WATER RESOURCES ENGINEERING
(CIVIL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

UNIT – I

1. a) Explain the types of rain gauges with their relative advantages and disadvantages.   7 M

   b) Discuss various methods available for measurement of rainfall.   7 M

OR

2. a) The isohyets for annual rainfall over a catchment were drawn and the areas of the strips between isohyets are obtained as below. Determine the average depth of annual precipitation over the area.

Isohyets (mm)	350-500	500-650	650-800	800-950	950-1150	1150-1250
Area (km^2)	1150	3500	3000	1200	800	400

7 M

   b) The surface runoff from a flood on a drainage basin amounted to 5.5 cm. The area of the basin is 25 km^2. The average depth of rainfall on the drainage basin was 17.5 cm, and the time distribution of the rainfall is given as follows. Calculate the ϕ - index for this storm. Assume data wherever necessary.

7 M

Hour	10-11	11-12	12-13	13-14	14-15	15-16	Total
Precipitation (mm)	18	24	52	25	36	20	175

UNIT – II

3. a) Given below are the ordinates of a unit hydrograph for a storm of 4-hour duration. Find ordinates of flood hydrograph when the maximum flood observed was 400 m^3/s and base flow was 250 m^3 /s.

Time (hrs)	0	4	8	12	16	20	24
Flow (m^3/s)	0	1500	1200	600	220	80	0

5 M

   b) What is unit hydrograph? Discuss unit hydrograph theory in detail.

9 M

OR

4. a) List out various physiographic factors which affect runoff. Discuss their influence on the volume of runoff.

7 M

   b) Given below are the observed flows (cumecs) from a storm of 6 hour duration on a stream with a drainage area of 316 km^2. Assume a constant base flow of 17 cumecs. Derive a 6-hour duration unit hydrograph.

Time (hr)	0	12	24	36	48	60	72
Flow	17	254.5	150	87.7	53.8	31.1	17

7 M

UNIT-III

5. a) Write a short note on aquifer parameters.

7 M

   b) Explain different types of wells in detail. What are the assumptions involved in steady flow to fully penetrating wells?

7 M

6. a) What are different types of aquifers? Draw neat sketches and explain.   7 M

    b) Derive an expression for steady radial flow into well fully penetrating confined aquifers.   7 M

UNIT – IV

7. a) Name any two methods used for estimating consumptive use of water for a particular crop at a particular place.   7 M

    b) Find the frequency of irrigation for the following data
    Field capacity : 27%
    Wilting point : 14%
    Density of soil : 1.5 g/cm^3
    Root zone depth : 75 cm
    Daily consumptive use : 11 mm   7 M

OR

8. a) Explain different types of Irrigation in detail.   7 M

    b) A water course has a culturable commanded area of 1500 hectares. The intensity of irrigation of crop A is 50% and for B is 40%. Crop A is a Kharif crop and crop B is a Rabi crop. Crop A has a kor (or) base period of 21 days and crop B has kor (or) base period of 14 days. Calculate the discharge of the water course if the kor depth for crop A is 15 cm and for B it is 20 cm.   7 M

UNIT – V

9. a) Discuss the classification of canals. 7 M

   b) Explain design steps involved in the lacey's silt theory. 7 M

OR

10. a) What is canal lining or alignment? What are its advantages? 5 M

    b) Design an irrigation channel based on Kennedy's theory with the following details

    Discharge : 60 cumec

    Bed Slope: 1 in 6000

    Critical Velocity Ratio m: 1.05

    Rugosity Coefficient: 0.02 9 M