

Code: CE5T3

**III B.Tech - I Semester – Regular/Supplementary Examinations
March 2021**

**WATER RESOURCES ENGINEERING - I
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) Explain any four forms of precipitation.
- b) Draw any one evaporation pan and show its components.
- c) Differentiate DRH and UH.
- d) Explain any one method of base flow separation.
- e) Write about the concept behind the rational method.
- f) Differentiate aquiclude and aquitard.
- g) Explain Darcy's law.
- h) List any four ill effects of irrigation.
- i) Differentiate duty and delta.
- j) Draw the flow chart for canal classification based on the functions performed by canals.
- k) Define balancing depth of cutting with the help of neat sketch.

PART – B

Answer any **THREE** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Describe the Tipping-bucket type of precipitation measurement.

5 M

b) The mass curve of rainfall duration of 180 min on a catchment is given below. The catchment has an initial loss of 0.7 cm. The Φ -index of the catchment is known to be 0.5 cm/hr. Calculate the total surface runoff from the catchment due to this storm.

5 M

Time from start (min)	0	30	60	80	100	120	150	180
Cumulative rainfall (mm)	0	0.9	1.9	3.6	5.8	6.5	8	10.3

c) In a catchment, whose shape can be approximated by a pentagon, four rain gauge stations are situated inside the catchment. The coordinates of the corners of the catchment that define its boundaries and the coordinates of the four rain gauge stations are given below. Also given are the annual rainfall recorded by the four stations in the year 2015. Determine the average annual rainfall over the catchment in that year by the Thiessen mean method.

6 M

Catchment Boundary	Corner Coordinates	Corner a (0, 0)	Corner b (100, 0)	Corner c (100, 80)	Corner d (60, 140)	Corner e (0, 80)
Rain gauge station	Station Co-ordinates Annual Rainfall (cm)	P (40, 20) 100	Q (80, 20) 90	R (80, 60) 150	S (40, 60) 70	

3. a) Given the ordinates of a 4-h UH as below. Derive the ordinates of a 12-h UH for the same catchment.

8 M

Time (hr)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4-h UH (m^3/s)	0	20	80	130	150	130	90	52	27	15	5	0

b) Flood-frequency computations for the river Chambal at Gandhisagar dam, by using Gumbel's method, yielded the following details:

8 M

Return Period T (years)	Peak Flood (m^3/s)
50	41000
100	47000

Estimate the flood magnitude in this river with a return period of 500 years.

4. a) Explain aquifer properties: Porosity, Specific yield, Specific retention and Transmissivity.

8 M

b) A well completely penetrates a confined aquifer of permeability 55 m/day. The length of the strainer is 40 m. Under steady state of pumping radius of influence was 500 m.

Calculate discharge

8 M

(i) if the well diameter is 40 cm and drawdown is 4 m

(ii) if the drawdown is 5 m and well diameter is 50 cm.

5. a) Describe about the surface irrigation with suitable figures. 8 M
- b) Intensity of irrigation is 30% for wheat and 12% for rice, where the culturable commended area of a distributory is 6500 ha. The Kor period for wheat is 4 weeks and for rice is 3 weeks. Determine the total outlet discharge required excluding losses in the channel. Assume depth for Kor watering as 100 mm and 230 mm for wheat and rice, respectively. 8 M
6. a) Design an irrigation channel carrying a full supply discharge of $30 \text{ m}^3/\text{s}$ with a bed load concentration of 40 mm. The average grain diameter of the bed material may be taken as 0.4 mm and its specific gravity as 2.67. Apply Lacey's theory. Assume channel bed slope as 1 in 3500. 10 M
- b) Explain salient characteristics of Lacey's theory and limitations in it. 6 M