B.Tech (Civil Engg.) 5th Semester (G-Scheme)
Examination, November-2023

HYDROLOGY & WATER RESOURCE ENGINEERING

Paper-PCC-CE-301-G

Time allowed : 3 hours]   [Maximum marks : 75

Note : Attempt five questions in total. *Question no. 1 is compulsory. Attempt one question from each section. All questions carry equal marks.*

1. (a) Define rain gauge density. Discuss the IS norms for the rain gauge density.

    (b) Discuss various methods of reducing evaporation from a water body.

    (c) Differentiate between infiltration and percolation.

    (d) Why is base flow separated from total runoff ?

    (e) Write short note on : Depth area duration curve.   5×3=15

Section-A

2. (a) Explain "Hydrological cycle" with neat sketch.   5

(b) Explain the concept of S hydrograph and under what circumstances you would advocate adoption of this hydrograph. Give a clear associated sketch. 10

3. The rain gauge station X was in operative for a part of a month during storm occurred. The storm rainfall recorded at the three surrounding stations A, B and C was 75, 55 and 85 mm respectively. If the average annual rainfall of stations A, B, C and X are 780, 660, 850 and 700 mm respectively. Estimate the storm rainfall of station X. 15

Section-B

4. (a) Describe the method of obtaining infiltration capacity rate curve of an experimental plot using rainfall simulator. 7

   (b) The infiltration capacities of an area at different intervals of time are indicated below. Find an equation for the infiltration capacity in the exponential form. 8

Time (hrs)	0	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Infiltration capacity (cm/hr)	10.5	5.65	3.20	2.18	1.50	1.25	1.10	1.0	1.0

5. A storm during dry weather has rainfall intensities of g, 12, 40, 3g, 30, 26, 28, b, 16, 32,36, 24, 14 and 4 mm/h at an hour intervals. What is the runoff volume from a basin area of 600 km² if the initial abstractions are 10 mm and d index for the basin is 10 mm/h ? What is the per cent error in runoff estimate if the initial abstractions are neglected ? 15

Section-C

6. What is unit hydrograph ? What are the basic proposition of the unit hydrograph theory ? What are the limitations of the unit hydrograph theory ? 15

7. (a) Explain Gumbel's method for flood frequency analysis. 5

(b) Estimated flood peaks for two return periods for a river is given below. Determine flood discharge in the river will have a return period of 1000 years. 10

Return period (years)	Peak flood (m³/s)
100	430
50	390

Section-D

8. (a) Discuss briefly the various steps involved in planning of water resources projects. 7

   (b) Discuss the environmental impact of multi-purpose water resources projects. 8

9. (a) What is meant by water harvesting ? Describe in brief, the rain water harvesting designed for agricultural use, with advantages and disadvantages. 7

   (b) What are the causes of drought ? What measures you will suggest for water conservation and augmentation ? 8