


Name:			
Enrolment No:			
UPES End Semester Examination, December 2024			
Course: Hydrology and Water Resources Engineering Program: B.Tech. Civil Engineering Course Code: CIVL4067		Semester: VII Time: 03 hrs. Max. Marks: 100	
Instructions: <u>Assume suitable values for any missing.</u>			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1.	Explain the concept of potential evapotranspiration and actual evapotranspiration.	04	CO3
Q 2.	State the various forms of precipitation with their salient points.	04	CO1
Q 3.	Ordinates of the 1-hr unit hydrograph of a basin at 1-hr intervals are 6, 9, 6, 4 and 2 m ³ /s. Determine the watershed area represented by this unit hydrograph.	04	CO2
Q 4.	State the various methods to reduce evaporation losses from a reservoir.	04	CO1
Q 5.	What do you understand by moving average method used for the presentation of rainfall data?	04	CO1
SECTION B (4Qx10M= 40 Marks)			
Q 6.	a. Explain the concept of consumptive use in the context of soil-water relationships and state its relevance. b. Calculate the delta for a crop when its duty is 5.25 km ² per m ³ /s on the field, and the base period of this crop is 55 days.	04+06	CO3
Q 7.	Explain Lacey's theory and discuss the three regime conditions for canal design according to Lacey's theory. <p style="text-align: center;">OR</p> Explain Kennedy's theory and discuss the regime conditions for canal design according to Kennedy's theory.	10	CO4
Q 8.	Examine the commonly used evaporimeters for the estimation of evaporation. Also, discuss how lake evaporation can be estimated from the use of evaporimeters.	10	CO1
Q 9.	Describe the classification of runoff based on the time delay between precipitation and the runoff. Also, explain the concept of natural flow in context of runoff.	10	CO2

SECTION-C
(2Qx20M=40 Marks)

Q 10.

- a. Explain the flood hydrograph curve with its critical points.
- b. Rainfall of magnitude 3.8 cm and 2.8 cm occurring on two consecutive 4-h durations on a catchment area of 27 km² produced the following hydrograph of flow at the outlet of the catchment. Estimate the rainfall excess and ϕ index.

Time from start of rainfall (h)	-6	0	6	12	18	24	30	36	42	48	54	60	66
Observed flow (m ³ /sec)	6	5	13	26	21	16	12	9	7	5	5	4.5	4.5

06+14

CO2

OR

- a. Explain the factors affecting the runoff hydrograph.
- b. Two storms, each of 6-h duration and having rainfall excess values of 3.0 cm and 2.0 cm respectively, occur successively. The 2 cm ER rain follows the 3 cm rain. The ordinates of a 6-h unit hydrograph for a catchment are given below:

Time (h)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
UH coordinate (m ³ /sec)	0	25	50	85	125	160	185	160	110	60	36	25	16	8	0

Estimate the resulting DRH.

Q 11.

- a. Design an irrigation channel section for the discharge of 40 cumecs, silt factor as 0.2 and side slopes 0.8:1.
- b. Design a stable canal section to carry 75 cumecs discharge at a slope of 0.30 m/km, having been given that $n = 0.031$, and $m = 1.20$, where the symbols have their usual meaning.

10+10

CO4