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Sr. No. 019502

December 2023

B.Tech. (ENV) V SEMESTER  
Engineering Hydrology (PCC-ENV-502)

Time: 3 Hours

Max. Marks: 75

- Instructions:
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
  2. Answer any four questions from Part -B in detail.
  3. Different sub-parts of a question are to be attempted adjacent to each other.
  4. Use of non programmable calculator is permitted.

PART -A

- Q1 (a) What is the hydrological cycle? What are the different components of the hydrological cycle? (1.5)
- (b) Define hydrograph and unit hydrograph. (1.5)
- (c) What is an aquifer? (1.5)
- (d) Define Darcy's Law. (1.5)
- (e) What is the difference between precipitation and evapotranspiration? (1.5)
- (f) What is hydraulic conductivity, and how can it be used to model groundwater flow? (1.5)
- (g) What is the difference between infiltration and percolation? (1.5)
- (h) What is the difference between a synthetic unit hydrograph and an actual unit hydrograph? (1.5)
- (i) Define S - Curve. (1.5)
- (j) Define watershed and catchment area. (1.5)

PART -B

- Q2 (a) Describe different forms of precipitation and types of precipitation. (10)
- (b) Draw a diagram showing distribution of soil moisture in infiltration process. Also explain different zones. (5)
- Q3 (a) Draw a neat sketch of flood hydrograph. Briefly explain its component parts. (5)
- (b) A river reach had a flood passing by. At a given instant the storage in the river was estimated as 16 ha-m. What would be the storage in the river after an interval of 3 hours if the average inflow and outflow are 15.2 m<sup>3</sup>/sec and 10.2 m<sup>3</sup>/sec respectively? (10)

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Q4 The ordinates of a 6 hr storm duration with a catchment area 500 km<sup>2</sup> (15)  
 assuming the base flow to be zero. Derive the ordinates of 6h UH.

Time	Discharge	Time	Discharge
0	0	36	70
6	100	42	50
12	250	48	35
18	200	54	25
24	150	60	15
30	100	66	5
		72	0

Q5 (a) Write short notes on following : (5)

- i. Return Period.
- ii. Transmissibility

(b) Explain the procedure of using a flood hydrograph occurred in a (10)  
 catchment to develop a unit hydrograph.

Q6 (a) Explain the procedure for finding the  $\phi$  - index and W index. (10)

(b) A storm of 10 cm precipitation produced a direct runoff of 5.8cm. The (5)  
 duration  
 of the rainfall is 16 hrs. Estimate the  $\phi$  - index.

Time (hour)	0	2	4	6	8	10	12	14	16
Cumulative Rainfall (mm)	0	0.4	1.3	2.8	5.1	6.8	8.5	9.5	10

Q7 The ordinates of 8 hour UH for a hydrograph basin are given below. (15)  
 Determine  
 the ordinates of 24hr UH using method of super position.

Time	Ordinates of 8h UH	Time	Ordinates of 8h UH	Time	Ordinates of 8h UH
0	0	32	231	64	14
4	5.5	36	165	68	9.5
8	13.5	40	112	72	6.6
12	26.5	44	79	76	4.4
16	45	48	57	80	2
20	82	52	42	84	1
24	162	56	31	88	0
28	240	60	22		

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