R18

Code No: 156BF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, February/March - 2022
HYDROLOGY AND WATER RESOURCES ENGINEERING
(Civil Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.a) Explain the hydraulic cycle in nature with the help of a neat sketch, indicating its various phases.

b) The following is the set of observed data for successive 15 minutes period of 105 minutes storm in a catchment.

Duration (min.)	Rainfall (cm/hr)
15	2.0
30	2.0
45	8.0
60	7.0
70	1.25
90	1.25
105	4.5

If the value of φ-index is 3.0 cm/hr, estimate the net runoff, the total rainfall and the value of W-index. [7+8]

2.a) Explain the method of determining direct run-off from a given storm hydrograph.

b) In a river basin a station A was inoperative during a storm, while stations B, C, D and E, surrounding A were in operation, registering 74 mm, 88 mm, 71 mm and 80 mm of precipitation. The coordinates of B, C, D and E are (9,6), (12, -9), (-11, -6) and (-7, 7) respectively, with co-ordinates of A as (0,0). Estimate the missing storm precipitation of station A by the inverse distance method. [7+8]

3.a) What are the methods of computing run-off from a catchment area? Give various formulae stating clearly the area for which each is applicable.

b) Explain in detail measurement of evaporation by evaporation pans. [8+7]

4.a) Explain the factors affecting infiltration.

b) The table given below gives the time distribution of a rainfall lasting for nine hours. If the direct runoff is 9.3 cm, determine the φ index of the storm and time of rainfall excess. [6+9]

Time from start(hr)	1	2	3	4	5	6	7	8	9
Incremental Rainfall in each hour (cm)	0.7	1.4	2.4	3.7	2.9	2.6	1.7	0.8	0.5

5.a) What do you understand by unit hydrograph? How is it derived?

b) The ordinates of a 4-hour unit hydrograph of catchment are given below:

Time (hours)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4th UH (m³/sec)	0	20	60	150	120	90	70	50	30	20	10	0

Derive the flood hydrograph in the catchment due to the storm given below:

Time from start of storm (h)	0	4	8	12
Accumulated rainfall (cm)	0	5.0	5.8	8.8

The φ-index for the catchment can be assumed to be 0.25 cm/hour and a constant base flow of 20 cm³/sec, is appropriate. [6+9]

6.a) What is a hydrograph? Draw a single peaked hydrograph and explain its components.

b) What do you mean by synthetic unit hydrograph write a note on it? [8+7]

7.a) Describe with the help of sketches, some of the common types of strainer wells.

b) What do you understand by crop rotation? What are its advantages? [8+7]

8.a) What is water logging? What are causes of water logging? What are its ill-effects?

b) Define sensitivity of an outlet. Find the relation between sensitivity and flexibility of an outlet. [7+8]

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