Code No: 156BF

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, August - 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) Describe various methods of computing average rainfall over a basin.
b) Explain in detail about Global Water Budget.
c) With a neat sketch, explain the concept of hydrological cycle. [5+5+5]

2.a) Explain in detail about any one recording and one non-recording type rain gauges.
b) A watershed of 695 km^2 with six rainfall gauges can be divided into Theissen polygon with the data listed in the accompanying table. Using the total storm rainfall depth listed, find the average rainfall over the watershed. [7+8]

Gauge	A	B	C	D	E	F
Rainfall (mm)	22	32.2	7.1	8.8	24.6	67.2
Area (km^2)	122	99	56	148	231	39

3. Calculate the Potential Evapotranspiration for an area in the month of August by Hargreaves and Blaney – Criddle method with the following available data: Latitude: 10^0N, Max. Temperature: 45.4^0C, minimum temperature: 22.6^0C, mean humidity: RH_{mean}: 72.8%, actual sunshine hours: 8.25 hr., wind speed @ 4 m high – 4.57 m/s. Assume any other relevant data. [15]

4.a) Explain the methods adopted to estimate the evaporation from surface water bodies.
b) The following observations were taken from a double ring infiltrometer with inside ring diameter of 40 cm. Plot the infiltration capacity curve and find the constant rate of infiltration that the experimental field have towards the end. Also compute the average infiltration rate for the first 30 minutes. [7+8]

Time (min.)	0	2	5	10	20	30	45	60	80	100	120	150	200
Cumulative volume (cu. cm)	0	200	450	810	1450	1840	2250	2510	2800	2900	3150	3554	4525

5.a) Given below are the ordinates of a 6-h unit hydrograph for a catchment. Calculate the ordinates of the DRH due to a rainfall excess of 4.25cm occurring in the 6h.

Time (h)	0	3	6	9	12	15	18	24	30	36	42	48	54	60
UH ordinate (m^3/s)	0	20	55	90	125	180	192	160	100	85	36	42	24	0

b) Exemplify the assumptions and applications of Unit Hydrograph in Water Resources Engineering problems. [7+8]

6.a) By means of neat sketch, explain about various components of single peaked hydrograph.

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

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44	48
Ordinates of 4-hr UH (m^3/s)	0	20	60	150	120	90	70	50	30	20	15	10	0

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

Time from start of storm (h)	0	4	8	12	16
Accumulated rainfall (cm)	0	5.6	5.9	9.25	11.30

[7+8]

7.a) An Unconfined aquifer has an area of 450 km^2, thickness of 25.5m and a porosity of 75%. What is its specific retention if it can yield 1950 million m^3 of free-draining water?

b) Determine the mean depth of irrigation in a furrow 85 m long and spaced 50 cm apart with an initial flow of 2.75 l/s for a period of 45 minutes. The stream was then reduced to 1.0 l/s after it reached the tail end of the furrow and continued for another 60 minutes. [5+10]

8.a) Exemplify the causes, effects and remedial measures of Water logging.

b) Design an irrigation channel on Kennedy's theory, to carry a discharge of 55 cumec. Take N = 0.0225 and m = 1.05. The channel has a bed slope of 1 in 6500. [7+8]

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