

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S5 (S, FE) / S3 (PT) (S) Examination June 2024 (2019 Scheme)

**Course Code: CET 307****Course Name: HYDROLOGY & WATER RESOURCES ENGINEERING**

Max. Marks: 100

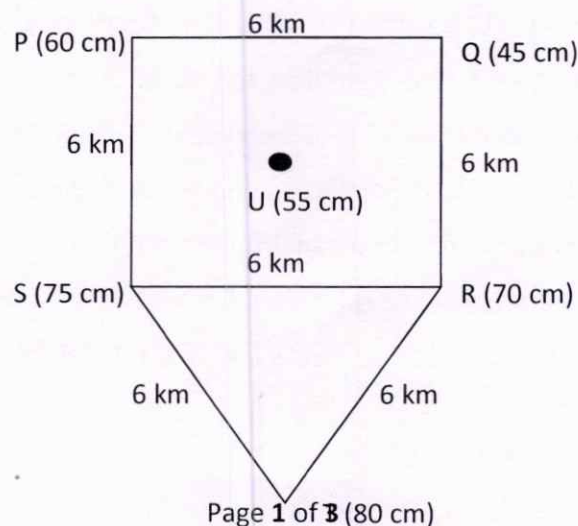
Duration: 3 Hours

**PART A***(Answer all questions; each question carries 3 marks)*

		Marks
1	Explain the various types of precipitation.	3
2	Define infiltration indices.	3
3	Describe the methods of base flow separation.	3
4	Enlist the various factors affecting runoff in a catchment.	3
5	Differentiate flow and lift irrigation.	3
6	Enumerate the various methods for improving duty.	3
7	What are the criteria to be considered while selecting the location for a stream gauge?	3
8	Illustrate the various zones of a reservoir.	3
9	Define porosity, specific yield and transmissibility.	3
10	State Darcy's Law. List down the assumptions.	3

**PART B***(Answer one full question from each module, each question carries 14 marks)***Module -1**

- 11 a) Illustrate the working of a siphon type recording rain gauge. 4
- b) The rainfall data observed from various rain gauge stations in a catchment is shown in the Figure. Compute the average precipitation using Thiessen Polygon method. 10



- 12 a) Explain the method of measurement of infiltration. Derive the Horton's model and discuss how the data is fit in the Horton's model. 7
- b) Obtain the  $\phi$ -index of a storm that has occurred for a duration of seven hours in a basin of catchment area of 2200 km<sup>2</sup> and the runoff is 43.7 Mm<sup>3</sup>. The rainfall intensity in mm/hr at hourly interval is given in the table. 7

Time (hrs)	7	8	9	10	11	12
Rainfall Intensity (mm/hr)	8	15	28	17	12	5

**Module -2**

- 13 Estimate the ordinates of a flood hydrograph from a 6 hr storm having 3 events of rainfall with depth of 2.8 cm, 4.3 cm and 1.6 cm successively each during 2 hours. Assume an initial loss as 1 mm, infiltration as 1.5 mm/hr and base flow as 15 m<sup>3</sup>/s. 14

Time (hrs)	0	2	4	5	8	10	12	14	16	18	20
UH	0	25	40	85	155	150	105	70	35	10	0

- 14 a) Derive the ordinates of a 9 hour unit hydrograph from the 3 hour unit hydrograph given below: 8

Time (hr)	0	3	6	9	12	15	18	21	24	27	30
UH	0	2	9	17	33	69	95	71	44	13	0

- b) Explain the method of obtaining a 3 hour UH from a 2 hour UH using S hydrograph with the help of figure. 6

**Module -3**

- 15 a) What are the ill effects of irrigation? 6
- b) In a particular soil with a dry unit weight of 12.5 kN/m<sup>3</sup>, the field capacity is 29% and the permanent wilting point is 13%. If the root zone depth is 1.1 m and the consumptive use is 15 mm, calculate the time frequency of irrigation. Assume readily available moisture as 75% of the available moisture. 8
- 16 a) Define duty and delta. Derive a relationship between the two. 5
- b) The gross commanded area for a canal in an irrigation project is 17,000 ha and out of this, 80% is culturable. The intensity of Kharif is 26% and that for Rabi is 50%. The base period for Kharif is 20 weeks and that for Rabi is 22 weeks. Compute the 9

outlet discharge assuming the outlet factor as 1000 ha/cumec for Kharif and 2200 ha/cumec for Rabi. Also estimate the delta for both the crops.

**Module -4**

- 17 The following data pertains to a stream gauging station. The velocity was obtained using a current meter with a rating equation of  $v = 0.18 + 0.35 N_s$  where  $N_s$  is the number of revolutions/sec and  $v$  in m/s. Calculate the discharge of the stream using mean-section method. 14

Distance from bank (m)	0	2	5	8	10	12	15	18	19
Depth (m)	0	0.8	1.2	1.9	2.3	1.7	1.1	0.6	0
Revolutions	0	26	42	68	85	53	31	12	0
Time of observation (s)	0	100	100	100	100	100	100	100	0

- 18 a) What is meandering. Discuss the meandering parameters with a neat sketch. 4  
 b) Explain in detail the step-by-step procedure for the determination of life of a reservoir. 10

**Module -5**

- 19 a) Summarize the method of determination of yield of an open well. 6  
 b) Derive steady state flow to a well in a confined aquifer. 8
- 20 a) Explain the various types of tube wells. 6  
 b) An open well with 0.35 m diameter fully penetrates an unconfined aquifer which extends to a depth of 100 m from the groundwater table. A steady discharge of 80 m<sup>3</sup>/hr was pumped from the well and the resulting drawdown in two observation wells at radial distances of 10 m and 20 m are 2.5 m and 0.8 m respectively. Compute the drawdown in the test well. 8

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