Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2019

Subject Code: 2150602 Date: 20/06/2019

Subject Name: Hydrology & Water Resources Engineering

Time: 02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

MARKS

Q.1 **(a)** Calculate the average annual rainfall using Theissen polygon method for the following data: **03**

Rain gauge station	1	2	3	4	5	6	7	8
Annual rainfall (cm)	34	35	36	37	38	39	40	41
Area (Km^2)	55	50	45	33	69	49	55	39

(b) Give the name of automatic rain gauges and explain any one in detail with figure. **04**

(c) Explain in detail with neat sketch the double mass curve technique to check the consistency of rainfall data. **07**

Q.2 **(a)** Explain the Rational Method for estimation of peak flood discharge. **03**

(b) Explain Darcy's law with figure. **04**

(c) In a certain river basin, there are four rain gauge stations, with their normal annual precipitation amounting to 800, 520, 450 and 390 mm, respectively. Determine the optimum number of rain gauges in the catchment, if it is desired to limit the error in the mean value of rainfall in the catchment to 10 %. **07**

OR

(c) A thunder storm of 6hour duration produces the following flood hydrograph. Derive the ordinates of unit hydrograph for a catchment area of 2845 km^2. Also sketch the resulting unit hydrograph. **07**

Date	July 3				July 4				July 5	
Time (hour)	6 am	12 pm	6 pm	12 am	6 am	12 pm	6 pm	12 am	6 am	12 pm
Discharge (m^3 /sec)	100	400	1500	3500	5100	3000	1500	900	400	100

Q.3 **(a)** Describe in brief Reservoir sedimentation **03**

(b) Describe the situations under which the following dams are constructed (1) Gravity dam (2) earthen dam **04**

(c) Discuss occurrence of groundwater with a neat sketch and define various water bearing formations. **07**

OR

Q.3 **(a)** Write a brief note on flood damage analysis. **03**

(b) Define following terms: (i) Firm Power, (ii) Load Factor, (iii) Gross Head, (iv) Operating Head **04**

(c) Explain the mass curve method that can be used for determining reservoir capacity. **07**

Q.4 **(a)** Discuss the measures to be adopted for water conservation in water scarce regions. **03**

(b) Distinguish between (1) Hydraulic and hydrologic method of flood routing (2) Hydrologic storage routing and hydrologic channel routing **04**

	(c)	Define the following with figure (1) Earthen dam (2) Gravity dam (3) Arch dam (4) Buttress dam (5) Spillway	**07**

OR

Q.4	**(a)**	What is the need for planning of water resources projects?	**03**
	(b)	Define 'Drought'. Distinguish between hydrological drought and meteorological drought.	**04**
	(c)	Explain with a neat sketch the components of a hydroelectric power plant.	**07**
Q.5	**(a)**	Discuss the factors affecting infiltration.	**03**
	(b)	Discuss the Penman-Monteith method for evapotranspiration estimation.	**04**
	(c)	Define flood and its causes. Also discuss various measures taken to control the flood.	**07**

OR

Q.5	**(a)**	Define the following with figure (1) Infiltration index (2) Specific yield	**03**
	(b)	Define unit hydrograph and its applications.	**04**
	(c)	Enlist various methods of flood estimation. Describe flood frequency analysis.	**07**

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