

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE- SEMESTER-VI EXAMINATION – WINTER 2025**

**Subject Code: 3160610**

**Date: 02-12-2025**

**Subject Name: Water Resources Engineering and Hydrology**

**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.
4. Simple and non-programmable scientific calculators are allowed.

**MARKS**

- Q.1**
- (a) Discuss methods adopted to separate the base flow. **03**
- (b) List out automatic rain gauges. Explain any one in detail with a neat sketch. **04**
- (c) A catchment has four rain gauge stations, with their normal precipitation as 850, 500, 450 and 360 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 12% **07**
- Q.2**
- (a) Define unit hydrograph. Write down the assumptions of unit hydrograph theory. **03**
- (b) Explain how the characteristics of drainage basin affect runoff. **04**
- (c) A 6 hr unit hydrograph for a basin has the following ordinates: **07**

Time (hrs)	0	6	12	18	24	30	36	42
6 hr U.H.O. (m <sup>3</sup> /s)	0	20	55	160	130	90	70	60
Time (hrs)	48	54	60	66				
6 hr U.H.O. (m <sup>3</sup> /s)	30	20	10	0				

Determine the ordinates of 12 hr unit hydrograph. Use S-curve method.

**OR**

- (c) The ordinates of 3 hr Unit hydrograph are given below : **07**

Time in hrs	0	3	6	9	12	15	18	21
Ordinates (cumecs)	0	12	26	30	22	16	12	9
Time in hrs	24	27	30					
Ordinates (cumecs)	5	3	0					

Find the ordinates of a 6 hr UH analytically. Also, sketch 6 hr – Unit hydrograph.

- Q.3** (a) Write down classification of dams. **03**  
(b) Discuss briefly drought contingency planning. **04**  
(c) Explain in brief classification of hydropower plants based on storage characteristics and based on head. **07**

**OR**

- Q.3** (a) List out causes of floods and explain any one cause of flood in detail. **03**  
(b) Explain drought. Also explain causes of drought. **04**  
(c) Draw a neat sketch of ‘Hydroelectric power plant’. Explain each component briefly. **07**

- Q.4** (a) Define: Aquiclude, Aquifuge and Aquitard. **03**  
(b) Discuss with a neat sketch, the various storage zones of reservoir. **04**  
(c) Derive an expression for discharge from a well fully penetrating a confined aquifer. **07**

**OR**

- Q.4** (a) Define: Specific yield, Specific retention and transmissibility. **03**  
(b) Explain measure to reduce evaporation losses from reservoir. **04**  
(c) Explain Recuperation test to estimate the safe yield of an open well. **07**

- Q.5** (a) Write a note on Flood walls. **03**  
(b) Explain Roof top rain water harvesting with neat sketch. **04**  
(c) Discuss the recharge to ground water method of rain water harvesting. **07**

**OR**

- Q.5** (a) Write a note on Levees. **03**  
(b) Discuss water conservation measures. **04**  
(c) Describe various environmental consequences of water-resource projects. **07**

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