

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021****Subject Code:3160610****Date:24/11/2021****Subject Name:Water Resources Engineering and Hydrology****Time:10:30 AM TO 01:00 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) What is Hydrologic Cycle? Write its applications. **03**
- (b) Write the assumptions and Limitations of unit hydrograph theory. **04**
- (c) Discuss the engineering measures for flood control. **07**

- Q.2**
- (a) What is Infiltration? Discuss the factors affecting the infiltration rate. **03**
- (b) Explain the use of Float type rain gauge. **04**
- (c) A storm with a 16.0 cm precipitation produced a direct runoff of 8.9 cm. The time distribution of the storm is as follows. Estimate the  $\phi$ -index of the storm. **07**

Time(hr.)	1	2	3	4	5	6	7	8
Incremental rainfall (cm)	0.7	1.36	2.30	3.48	2.8	2.6	2.0	0.76

**OR**

- (c) The ordinates of 4-hour unit hydrograph are given below. **07**

Time in Hours	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates $m^3/sec$	0	20	50	150	120	90	70	50	30	20	10	0

Find the ordinates of 8-hour unit hydrograph for the same basin.

- Q.3**
- (a) Define the following terms 1) Percolation 2) Base flow 3) W-index **03**
- (b) Discuss with neat sketch, the various storage zones of reservoir. **04**
- (c) Briefly discuss the components of a hydropower project. **07**

**OR**

- Q.3**
- (a) Define the following terms 1) Density currents. 2) Trap efficiency. 3) Useful life of reservoir. **03**
- (b) Explain Darcy's law and give its limitations **04**
- (c) Discuss the various methods of controlling sedimentation of reservoirs. **07**

- Q.4**
- (a) Define the following terms 1) Aquifer 2) Aquiclude 3) Aquifuge **03**
- (b) Differentiate between Runoff River plant and storage plant. **04**
- (c) Explain how the elevation area curve and elevation capacity curve are prepared? What is the use of this curve in reservoir planning? **07**

**OR**

- Q.4**
- (a) Explain Design flood and Time of Concentration **03**
- (b) Differentiate between Confined aquifer and Unconfined aquifer. **04**
- (c) Explain Recuperation test to estimate the safe yield of an open well. **07**

- Q.5** (a) Discuss channel routing in detail. **03**  
(b) Discuss water resources planning and its objectives. **04**  
(c) Discuss the measures to be adopted for water conservation and augmentation in water scarce regions. **07**
- OR**
- Q.5** (a) Discuss the factors affecting runoff in a catchment area **03**  
(b) Explain various methods of estimating floods. **04**  
(c) What is S-hydrograph? How it is constructed? What are its uses? **07**

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2022****Subject Code:3160610****Date:01/06/2022****Subject Name:Water Resources Engineering and Hydrology****Time:10:30 AM TO 01:00 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) | Enlist the methods that are adopted to evaluate the rate of evaporation.   | <b>03</b> |
| (b) | Describe double mass curve technique to check consistency of rain gauge station data.  | <b>04</b> |
| (c) | There are four rain-gauge stations installed on certain river basin whose normal annual precipitations amounting to 850, 520, 430 and 370mm 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 15%. | <b>07</b> |

- Q.2**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain the difference between Hyetograph and Hydrograph with sketch. | <b>03</b> |
| (b) | Describe base flow separation methods with sketch.                    | <b>04</b> |
| (c) | What do you mean by flow duration curve? And also mention its uses.   | <b>07</b> |

**OR**

- |     |   |           |
|-----|---|-----------|
| (c) | Define “Unit Hydrograph”. Write down the assumption made in unit hydrograph theory. | <b>07</b> |
|-----|---|-----------|
- Q.3**
- |     |  |           |
|-----|--|-----------|
| (a) | Define:- Confined aquifer, specific yield and coefficient of transmissibility          | <b>03</b> |
| (b) | Describe constant level pumping test to find the yield of an open well.                | <b>04</b> |
| (c) | Explain groundwater occurrence with sketch and define various water bearing formation. | <b>07</b> |

**OR**

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | How will you carry out hydrological investigation for planning of reservoir?                | <b>03</b> |
| (b) | Elaborate trap efficiency. Explain different methods of control of reservoir sedimentation. | <b>04</b> |
| (c) | What are various factors that affect the site selection of dam? Discuss them briefly.       | <b>07</b> |

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | List out components of hydropower project also draw general layout of a hydropower plant.                | <b>03</b> |
| (b) | Write short note on Surge Tank   | <b>04</b> |
| (c) | Explain in brief classification of hydropower plants based on storage characteristics and based on head. | <b>07</b> |

**OR**

- Q.4** (a) Explain levees with sketch **03**  
(b) Explain rational method of flood estimation. **04**  
(c) What return period you would adopt in the design of a culvert on a drain if you are allowed to accept only 20% risk of flooding in the 50 years of expected life of the culvert? **07**

- Q.5** (a) Discuss various types of drought. **03**  
(b) Describe in detail with sketch the components of the roof top rainwater harvesting system. **04**  
(c) Explain “runoff enhancement”. **07**

**OR**

- Q.5** (a) What are the objectives of water resources planning? **03**  
(b) What are functional requirement of water resources planning? **04**  
(c) Describe various environmental consequences of water-resource projects. **07**

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