Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 711204N **Date: 06-06-2013**

Subject Name: Water Resources Engineering

Time: 10.30 am – 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.**

Q.1 (a) Explain different types of precipitation. **07**

(b) The following are the ordinates of a 3- hour unit hydrograph. Derive the ordinates of a 6-hour unit hydrograph and draw a neat sketch. **07**

Time in hr.	0	3	6	9	12	15	18	21	24
3 hr UHO in cumecs	0	12	42	85	15	9.5	4.5	2	0.6

Q.2 (a) The estimated flood peaks for two return periods by the use of Gumbel's method are as follows: **07**

Return period	Peak flood(m^3/s)
100	465
50	370

What flood discharge in this river will have a return period of 1000 years?

(b) Explain factors affecting runoff. **07**

OR

(b) Derive Thiem's formula for unconfined aquifer. **07**

Q.3 (a) Explain the methods used for measurement of Evaporation? **07**

(b) There are six rain gauge stations existing in the catchment. The annual rainfall recorded by the gauges are 40,50, 35, 52, 45 and 68 cm. For 8% error in estimation of the mean rainfall, calculate the optimum number of rain gauge stations in the basin. **07**

OR

Q.3 (a) Define and explain: Permeability & Transmissibility, Aquifer & Aquicludes, Specific yield. **07**

(b) A storm with a 16 cm precipitation produced a direct runoff of 9.2 cm. The time distribution of the storm is as follows: **07**

Time in hr.	1	2	3	4	5	6	7	8
Incremental rainfall in each hr in cm	0.5	1.45	2.35	3.50	2.5	2.3	1.6	0.6

Estimate the ø index of the storm.

Q.4 (a) Discuss the various methods used for controlling floods with their merits and demerits. **07**

(b) A well penetrates into an unconfined aquifer having a saturated depth of 120 m. The discharge is 270 litres per minute at 12 m drawdown. Assuming equilibrium flow conditions and a homogeneous aquifer, estimate the discharge at 18 m drawdown. The radius of influence may be taken as equal in both cases. **07**

OR

Q.4 (a) Write short note on: Infiltrometers and Rain simulators. **07**

(b) The ordinates of the observed flood hydrograph of 3 hour storm are as follows: **07**

Time in hr.	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
Discharge in cumecs	5	5	7.5	12.5	22	30	27	15	11	9.5	8	7	6.5	5.6	5.2	5

The drainage area is 25 km^2. Derive the 3 hour unit hydrograph for the basin.

Q.5	**(a)**	What is 'hdrological cycle' and what is its importance?	**07**
	(b)	Explain the s-curve method of developing a 3 hr unit hydrograph by using 6 hr unit hydrograph of a catchment.	**07**
		OR	
Q.5	**(a)**	What is a unit hydrograph? Explain the limitations of unit hydrograph theory.	**07**
	(b)	List out the flood forecasting methods and explain any one out of them.	**07**

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