Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 711204 **Date: 21-06-2014**

Subject Name: Water Resources Engineering

Time: 02:30 pm - 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.**

Q.1 (a) Discuss briefly factors affecting runoff. **07**

(b) Using Gumbel's method estimate 150 year flood for the river, having other data as per table given below, **07**

Return period(years)	Peak flood(m^3/s)
100	525
50	465

Q.2 (a) The ordinates of unit hydrograph for 3 hour duration are given below. Calculate the ordinates of a 6 hour unit hydrograph and draw a neat sketch. **07**

Time in hours	0	3	6	9	12	15	18	21	24	27	30	33
3hr UHO in cumecs	0	9	12	36	72	95	125	80	50	30	15	0

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

OR

(b) Explain the following terms in respect to ground water: specific yield, permeability and transmissibility, perched aquifer, storage coefficient. **07**

Q.3 (a) Discuss briefly methods of flood control. **07**

(b) A well is located in a 30m thick confined aquifer of permeability 40 m/day and storage coefficient of 0.004. If the well is pumped at the rate of 1700 litres per minute, calculate the drawdown at a distance of 50 m from the well after 20 hours of pumping. **07**

OR

Q.3 (a) List out flood forecasting methods and discuss any one method briefly. **07**

(b) A 30 cm diameter well penetrates 25 m below the static water table. After 24 hours of pumping @ 6000litres/minute the water level in a test well at 80 m is lowered by 0.57m, and in a well 40 m away the drawdown is 1.15 m. What is the transmissibility of the aquifer? **07**

Q.4 (a) Explain factors affecting evaporation. **07**

	(b)	For a catchment area of $40km^2$, the following mass curve of rainfall was recorded.	07

Time from start of storm(h)	0	2	4	6	8	10	12	14
Accumulated rainfall(mm)	0	8	15	62	70	85	90	100

If the volume of runoff due to the storm measured is $1.6 * 10^6 m^3$, estimate the Ø index of the catchment.

		OR	
Q.4	**(a)**	Explain the factors affecting infiltration capacity.	**07**
	(b)	Determine the optimum number of rain gauges in a catchment using the following data: (1) Number of rain gauge = 6 (2) Mean annual precipitations at gauge(cm) = 32,55,41,50,51,68 (3) Permissible error = 8%	**07**
Q.5	**(a)**	Describe 'Hydrological cycle' with neat sketch.	**07**
	(b)	Explain S-curve hydrograph.	**07**
		OR	
Q.5	**(a)**	Explain 'tipping bucket type' recording rain gauge with a neat sketch.	**07**
	(b)	Define 'unit hydrograph'. Also discuss limitations and uses of unit hydrograph theory.	**07**

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