

GUJARAT TECHNOLOGICAL UNIVERSITY
ME Semester –I Examination Feb. - 2012

Subject code: 711204N

Date: 15/02/2012

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) What is unit hydrograph? What are the limitations of unit hydrograph? **07**
 (b) Determine the optimum number of rain gauges in a catchment area using the following data: **07**
- 1) Numbers of rain gauge = 4
 - 2) Mean annual precipitations at gauge = 850, 570, 490 & 450 mm
 - 3) Permissible error = 12 %

- Q.2** (a) Ordinates of 8 hour unit hydrograph for a drainage basin are as per table below. Determine a 24 hour unit hydrograph by analytical method. **07**

Time in hour	0	4	8	12	16	20	24	28	32
Ordinates m ³ /sec	0	4.5	11.5	28	42	80	110	90	65
Time in hour	36	40	44	48	52	56	60		
Ordinates m ³ /sec	45	22	9	4.5	2.0	1.0	0.0		

- (b) Explain “Hydrological cycle” with neat sketch. **07**

OR

- (b) Explain S-curve hydrograph. **07**

- Q.3** (a) Explain the various factors which affect the runoff from a basin. **07**
 (b) The infiltration capacities (f) of an area at different intervals of time are as follows. Find an equation for the infiltration capacity in the exponential form. **07**

Time in hours	0	0.25	0.50	0.75	1.0	1.25	1.50	1.75	2.0
(f) cm/hr	11.6	6.8	4.4	3.2	2.5	1.3	1.1	1.0	1.0

OR

- Q.3** (a) Explain briefly Infiltrimeters and Rain simulators. **07**
 (b) The ordinates of a 3hour unit hydrograph are given below. **07**

Time in hour	0	3	6	9	12	15	18	21	24	27	30
Ordinates m ³ /sec	0	6	10	30	26	20	17	12	7	3	0

Find the ordinates of a 6 hour unit hydrograph analytically.

- Q.4** (a) Explain the methods of flood control. **07**
 (b) The peak values of the floods from the year 1941 to 1955 are 4000, 5400, 7000, 4500, 3900, 5800, 4900, 4300, 7700, 6400, 5300, 4700, 5200, 10000 and 5100 cumecs. Estimate the magnitude of flood having frequency equal to (a) 100 years (b) 300 years. Take $\bar{Y}_n = 0.5128$ and $S_n = 1.0206$. **07**

OR

- Q.4** (a) Derive Thiem's formula for unconfined aquifer. **07**
(b) A 30cm diameter well penetrates 25 m below the static water table. After 24 hours of pumping @ 6500 litres/minute, the water level in a test well at 100 m is lowered by 0.47 m and in a well 35 m away the drawdown is 1.0 m. What is the transmissibility of the aquifer? **07**

- Q.5** (a) Define 'flood routing'. Explain briefly reservoir flood routing. **07**
(b) Explain the factors influencing evaporation. Also explain any one practical method of determining evaporation. **07**

OR

- Q.5** (a) Explain briefly tipping bucket type recording gauge. **07**
(b) Explain the methods of estimating the design flood. **07**
