

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. IST Semester–Remedial Examination – July- 2011****Subject code: 711204****Subject Name: Water Resources Engineering****Date: 13/07/2011****Time: 10:30 am – 01:00 pm****Total Marks: 60****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Differentiate between recording and non-recording types of rain gauges. Explain with a neat sketch the construction and use of a Tipping bucket type of a recording gauge. **06**
- (b)** A 3-hour storm occurred at a place and the precipitations in the neighboring rain gauge stations P, Q and R were measured as 3.6, 4.0 and 4.3 cm respectively. The precipitation in the neighboring station S could not be measured since the rain gauge bottle was broken. The normal precipitations in the four stations P, Q, R and S as per IMD bulletin were 45, 54, 48 and 43 cm respectively. Estimate the storm precipitation at station S. **06**

- Q.2 (a)** The rates of rainfall for successive 20 minutes period of a 140 minutes storm are 2.3, 2.3, 10.0, 7.0, 1.20, 1.20 and 5.0 cm/hr. Taking the value of ϕ_{index} as 3.0 cm/hr, find out the net runoff in cm, the total rainfall and the value of W_{index} . **06**
- (b)** What is the scope of Hydrology? What are the basic data required for hydrological studies? **06**

OR

- (b)** Explain the terms: Pan coefficient and ϕ_{index} . **06**
- Q.3 (a)** Explain briefly the elements and limitations of unit hydrograph. **06**
- (b)** The data of 3 hour unit hydrograph is given below. Find the peak flow resulting from three successive 3 hour periods of rainfall producing 0.36, 0.85 and 0.75 cm of runoff respectively from a basin. **06**

Time in hr.	0	1	2	3	4	5	6	7	8
Flow in m ³ /s	0	12	54	169	333	446	396	281	211
Time in hr.	9	10	11	12	13	14	15		
Flow in m ³ /s	165	120	85	65	35	16	0		

OR

- Q.3 (a)** Write a brief note on the characteristics of the drainage basin. **06**
- (b)** The ordinates of a 3 hour unit hydrograph are given below. Calculate the ordinates of a 6 hour unit hydrograph analytically. Also sketch this unit hydrograph. What is the peak value of discharge in this hydrograph? **06**

Time in hr.	0	3	6	9	12	15	18	21	24	27	30
Ordinates m ³ /s	0	12	27	22	18	14	11	8	5	3	0

- Q.4 (a)** Discuss the various methods of avoiding damage by floods. **06**

- (b) A 30 cm diameter well penetrates 25 m below the static water table. After 24 hours of pumping @ 5000 litres/minute, the water level in a test well at 85 m is lowered by 0.50 m and in a well 30 m away the drawdown is 1.21 m. Find the transmissibility of the aquifer. **06**

OR

- Q.4** (a) Write short notes on: Aquifers and their types. **06**
(b) Estimate the magnitude of flood having frequency equal to 80 years by Gumble's method by using analytical technique. The records of maximum flood collected from 1971 to 1987 are 3050, 4300, 6000, 3400, 2850, 4700, 4000, 3100, 6500, 5100, 4200, 3700, 4300, 9100, 3900, 3600, 5200 cumecs. Take the value of frequency factor $K_{(80)} = 3.705$. **06**

- Q.5** (a) Explain Darcy's law for measuring velocity of ground water flow. **06**
(b) What is meant by 'Design flood'? What is its importance? **06**

OR

- Q.5** (a) Explain the terms: Permeability and Storage co-efficient of an aquifer. **06**
(b) Explain the factors affecting infiltration capacity. **06**
