

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E –Ist SEMESTER–EXAMINATION – JULY- 2012****Subject code: 711204 N****Date: 13/07/2012****Subject Name: Water Resources Engineering****Time: 2:30 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)	Explain with a neat sketch the construction and use of a ‘tipping bucket type’ of a recording gauge.	07																								
	(b)	The ordinates of a 3hour unit hydrograph are given below. <table border="1"><tr><td>Time in hour</td><td>0</td><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td><td>21</td><td>24</td><td>27</td><td>30</td></tr><tr><td>Ordinates m³/sec</td><td>0</td><td>12</td><td>26</td><td>20</td><td>15</td><td>10</td><td>8</td><td>7</td><td>5</td><td>3</td><td>0</td></tr></table> Find the ordinates of a 6 hour unit hydrograph for the same basin, analytically. Also sketch this unit hydrograph.	Time in hour	0	3	6	9	12	15	18	21	24	27	30	Ordinates m ³ /sec	0	12	26	20	15	10	8	7	5	3	0	07
Time in hour	0	3	6	9	12	15	18	21	24	27	30																
Ordinates m ³ /sec	0	12	26	20	15	10	8	7	5	3	0																
Q.2	(a)	A catchment area of 30 km² has one recording gauge. During a storm, the following mass curve of rainfall was recorded. <table border="1"><tr><td>Time from start of storm(hour)</td><td>0</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td><td>14</td></tr><tr><td>Accumulated rainfall(mm)</td><td>0</td><td>5</td><td>17</td><td>54</td><td>68</td><td>80</td><td>87</td><td>90</td></tr></table> If the volume of the rainfall due to the storm measured is $1.3 \times 10^6 \text{ m}^3$, estimate the ϕ_{index} of the catchment.	Time from start of storm(hour)	0	2	4	6	8	10	12	14	Accumulated rainfall(mm)	0	5	17	54	68	80	87	90	07						
Time from start of storm(hour)	0	2	4	6	8	10	12	14																			
Accumulated rainfall(mm)	0	5	17	54	68	80	87	90																			
	(b)	What is infiltration capacity? What are the factors affecting infiltration capacity.	07																								
		OR																									
	(b)	Explain the various factors which affect the runoff from a catchment.	07																								
Q.3	(a)	What is unit hydrograph? Explain the uses and limitations of unit hydrograph.	07																								
	(b)	Flood frequency records on a river has been collected for 10 years starting from 1951 to 1960 and the peak values of the floods observed during each of these 10 years are 3200, 4250, 6250, 3100, 2800, 3500, 8500, 8900, 4200, 5200. Estimate the magnitude of flood having frequency equal to 80 years by Gumble’s probability method by analytical technique. Take $Y_n = 0.4952$ and $S_n = 0.9496$.	07																								
		OR																									
Q.3	(a)	Write short note on: Flood routing through reservoirs.	07																								
	(b)	There are four rainguage stations, with their normal annual precipitations amounting to 820, 540, 460 and 400 mm 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 is 12%.	07																								

Q.4	(a)	Explain the hydrological cycle with a neat sketch, indicating its various phases.	07																								
	(b)	A well penetrates into an unconfined aquifer having a saturated depth of 110 metres. The discharge is 300 litres per minute at 15 metres drawdown. Assuming equilibrium flow conditions and a homogeneous aquifer, estimate the discharge at 22 metres drawdown. The distance from the well where the drawdown influences are not appreciable may be taken to be equal for both the cases.	07																								
		OR																									
Q.4	(a)	Write short note on Darcy's law for measuring velocity of ground water flow.	07																								
	(b)	The ordinates of 3 hour unit hydrograph are given below; find the peak flow, resulting from three successive 3 hour periods of rainfall producing 0.38, 0.82 and 1.42 cm of runoff respectively from a basin. Neglect base flow. <table><tr><td>Time in hour</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>Ordinates in m³/sec</td><td>0</td><td>18</td><td>45</td><td>65</td><td>78</td><td>87</td><td>98</td><td>75</td><td>45</td><td>16</td><td>0</td></tr></table>	Time in hour	0	1	2	3	4	5	6	7	8	9	10	Ordinates in m ³ /sec	0	18	45	65	78	87	98	75	45	16	0	07
Time in hour	0	1	2	3	4	5	6	7	8	9	10																
Ordinates in m ³ /sec	0	18	45	65	78	87	98	75	45	16	0																
Q.5	(a)	Explain briefly the methods of flood control.	07																								
	(b)	Write short note on permeability, transmissibility and their relationship.	07																								
		OR																									
Q.5	(a)	Explain briefly commonly used evaporimeters.	07																								
	(b)	Explain briefly the various methods of estimation of peak flood.	07																								
