Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E -Ist SEMESTER-EXAMINATION - JULY- 2012

Subject code: 711204 N

Subject Name: Water Resources Engineering

Date: 13/07/2012

Total Marks: 70

Time: 2:30 pm – 05:00 pm

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'											07		
		of a recording gauge.													
	(b)	The ordinates of a 3hour unit hydrograph are given below. 0											07		
		Time in	0 3	6	9	12	15	18	21	24	27	30			
		hour													
		Ordinates	0 1	2 26	20	15	10	8	7	5	3	0			
		m ³ /sec													
		Find the ordinates of a 6 hour unit hydrograph for the same basin,													
		analytically. Also sketch this unit hydrograph.													
Q.2	(a)	A catchment area of 30 km^2 has one recording gauge. During a storm, the												07	
		following mass curve of rainfall was recorded.													
		Time fro	om 0		2	4	6		8	10)	12	14		
		start	of												
		storm(hour	;)											_	
		Accumulat	ed 0		5	17	5	4	68	80)	87	90		
		rainfall(mm)													
		If the volume of the rainfall due to the storm measured is $1.3 \times 10^6 \text{ m}^3$,													
		estimate the \emptyset_{index} of the catchment.												.	
	(b)	What is infiltration capacity? What are the factors affecting infiltration (07	
		capacity.													
	(1)	UK Explain the various factors which affect the runoff from a catchment												07	
	(D)	Explain the various factors which affect the runoff from a catchment.												0/	
0.2	(\mathbf{a})	What is unit hydrograph? Evaloin the uses and limitations of which												07	
Q.3	(a)	what is unit hydrograph? Explain the uses and limitations of unit												07	
	(b)	Flood frequency records on a river has been collected for 10 years starting A												07	
	(U)	from 1951 to 1960 and the peak values of the floods observed during each of												07	
		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 $Yn =$													
		0.4952 and Sn = 0.9496 .													
		- - 0.7470.													
		OR													
Q.3	(a)	Write short note on: Flood routing through reservoirs.												07	
	(b)	There are four rainguage stations, with their normal annual precipitations												07	
	(-)	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%.													

0.4	(a)	Explain the hydrological cycle with a neat sketch, indicating its various 07												07
•		phases.												
	(b)	A well penetrates into an unconfined aguifer having a saturated depth of $110 0'$												07
		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.												
		OR												
Q.4	(a)	Write short note on Darcy's law for measuring velocity of ground water												07
-		flow.												
	(b)	The ordinates of 3 hour unit hydrograph are given below; find the peak flow,												07
		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.												
		Time in 0 1 2 3 4 5 6 7 8 9 10												
		hour												
		Ordinates	0 18	45	65	78	87	98	75	45	16	0		
		in m ³ /sec												
Q.5	(a)	Explain brief	ly the r	neth	ods o	f floo	od co	ntrol	•					07
	(b)	Write short note on permeability, transmissibility and their relationship.												07
		OR												
Q.5	(a)	Explain briefly commonly used evaporimeters.												07
	(b)	Explain brief	ly the v	ario	us m	ethod	ls of	estin	natio	n of 1	peak	flood	1.	07
