Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 711202N **Date: 07/07/2012**

Subject Name: Hydrology & Watershed Management

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)** What is watershed management? Why it is considered as a scientific unit to manage water? **07**

(b) Explain in detail through equations the 'lag time' and 'time of concentration' of a watershed. **07**

Q.2 **(a)** Define watershed, its characteristics and watershed hydrology. **07**

(b) What is hydrological-simulation modeling? Write the advantages and disadvantages of such modeling. Enlist five names of generic models. **07**

OR

(b) Write a brief overview of ARS-SWAT **or** HEC-HMS model. Also give a flow chart explaining various hydrological processes simulated by it. **07**

Q.3 **(a)** Differentiate between deterministic and stochastic models. **07**

(b) How remote sensing is used in watershed modeling and management. **07**

OR

Q.3 **(a)** Determine and comment on the values of mean, median, mode, standard deviation, coefficient of variance and skewness for the following rainfall data (in mm): 721, 543, 319, 763, 410, 608, 522, 488, 578, 998, 436, 594, 433, 517 and 674. **07**

(b) How GIS is used in watershed modeling and management. **07**

Q.4 **(a)** Describe spatial variability in hydrology with suitable exemplary data. **07**

(b) The following records of maximum flood are available. Estimate the magnitude of flood having frequency equal to 100 years and 150 years by Gumbel's method. Record collected from 1901 to 1915 is: 4000, 5400, 7500, 4500, 3000, 3700, 3300, 7000, 6000, 3800, 4800, 10000, 4500, 4000, 6000 cumecs. **07**

OR

Q.4 **(a)** What is watershed equilibrium? How it can be achieved? **07**

(b) The hydrograph of inflow to a reservoir is given as below. **07**

Time (days)	0	2	4	6	8	10	12	14	16	18	20
Flow (m^3/sec)	60	120	425	555	445	320	260	200	150	100	65

The reservoir is full at the start of the flood inflow. The storage S of the reservoir above the spillway crest is given in million cubic meters by S = 0.65h, where h is the head in meters above the crest. The discharge over spillway is given in cumecs by Q = 55h. Find the head over the spillway

crest at the end of 8th day of the flood.

Q.5	**(a)**	Explain Pul's method of routing a hydrograph through a reservoir.	**07**
	(b)	Explain in detail MUSLE theory for soil transportation.	**07**
		OR	
Q.5	**(a)**	Explain channel routing by Muskingum method.	**07**
	(b)	Define: 'time step', 'stream network', 'pour point' and 'HRU'.	**07**

****