Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. – SEMESTER – IV EXAMINATION – OCTOBER 2012

Subject code: 741201 Date: 25-10-2012

Subject Name: Hydrological Modeling

Time: 2:30 pm – 5:00 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 the importance of continuous time based hydrological models in comparison to event based hydrological models.	**07**
	(b)	Compare lumped models to physically based models.	**07**
Q.2	**(a)**	Explain the role of 'time step' in hydrological modeling. Give the 'time steps' used in HEC-HMS, ARS-SWAT and MODFLOW.	**07**
	(b)	What is a pre-processor to a simulation model? Write all preprocessing capabilities of MWSWAT.	**07**
		OR	
	(b)	What is sensitivity analysis? How it could be performed in hydrological models.	**07**
Q.3	**(a)**	Explain SCS Curve Number (CN) method used in HEC-HMS and ARS-SWAT.	**07**
	(b)	Explain various statistical measures which can be employed for calibration and validation of a hydrological model.	**07**
		OR	
Q.3	**(a)**	Explain MUSLE theory for soil transportation.	**07**
	(b)	Write in detail about the output files from ARS-SWAT and their utility.	**07**
Q.4	**(a)**	What is HRU's in SWAT? Explain procedure of formation of HRU's.	**07**
	(b)	Calculate the value of coefficient of determination R^2 for given data in table 1.	**07**
		OR	
Q.4	**(a)**	What is a sub-watershed? Why a large watershed divided into many sub-watersheds in hydrological modeling?	**07**
Q.4	**(b)**	Calculate the value of Nash-Sutcliffe coefficient for given data in table 1.	**07**
Q.5	**(a)**	How hydrological modeling can be put to use in mitigation of floods?	**07**
	(b)	Compare the capabilities of HEC-HMS and ARS-SWAT.	**07**
		OR	
Q.5	**(a)**	Demonstrate the role played by GIS technologies in pre-processing and post processing of hydrological data.	**07**
	(b)	Write key modules and algorithm of MODFLOW.	**07**

Table 1 Data

Date/Time	Rainfall mm	Runoff Depth in mm	Simulated Runoff Depth in mm
7/20/2010	35.00	27.91	10.88
7/21/2010	12.50	13.3	2.86
7/22/2010	0.00	6.74	2.5
7/23/2010	0.00	6.06	2.67
7/24/2010	0.00	5.25	2.83
7/25/2010	5.00	4.93	2.97
7/26/2010	0.00	3.92	3.09
7/27/2010	38.50	25.13	9.2
7/28/2010	3.50	5.68	3.46
7/29/2010	17.50	2.97	4.77

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