

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
