Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–IV • EXAMINATION – SUMMER • 2014

Subject Code: 741201 Date: 04-06-2014

Subject Name: Hydrological Modeling

Time: 02:30 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 pre-processor to a simulation model? Explain it with an example. **07**

(b) What is the role of threshold value in automatic digitization of the drainage network? **07**

Q.2 **(a)** Write all the calibration parameters of SWAT 2009. How calibration is accomplished in SWAT 2009? Write complete procedure with role of SWAT Editor. **07**

(b) Explain role of sub-watersheds in SWAT. Which hydrological processes could be modeled at sub-watershed level? **07**

OR

(b) What is HRUôs in SWAT? Explain formation of HRUôs and their role played in modeling. **07**

Q.3 **(a)** What is sensitivity analysis? How it could be performed in hydrological models. **07**

(b) Explain at least three statistical measures which can be employed for calibration of a hydrological model. **07**

OR

Q.3 **(a)** Explain the importance of the ópublic domainô simulation packages through examples in water resources management. **07**

(b) Write the methods used to calculate runoff in SWAT or HEC-HMS. **07**

Q.4 **(a)** Write importance of hydrological data in simulation modeling. **07**

(b) Calculate the value of coefficient of determination R^2 for given data in table 1. **07**

OR

Q.4 **(a)** Write the importance and implications of ótime stepô in hydrological modeling. **07**

(b) Calculate the value of Nash-Sutcliffe ratio for given data in table 1. **07**

Table 1 Data

Date/Time	Rainfall in mm	Runoff Depth in mm	Simulated Runoff Depth in mm
7/20/2013	39.00	28.71	10.88
7/21/2013	19.50	15.3	2.86
7/22/2013	0.00	6.74	2.5
7/23/2013	0.00	6.06	2.67
7/24/2013	0.00	5.25	2.83
7/25/2013	6.00	4.93	2.97
7/26/2013	2.00	4.12	3.09
7/27/2013	37.50	25.13	9.2
7/28/2013	3.50	5.68	3.46
7/29/2013	17.50	2.97	4.77

Q.5 **(a)** Compare the capabilities of HEC-HMS and ARS-SWAT. **07**

(b) Demonstrate the role played by remote sensing technologies in working with hydrological modeling. **07**

OR

Q.5 **(a)** Write the capabilities of MODFLOW 2005. **07**

(b) Demonstrate the role played by GIS technologies in pre-processing and post processing of hydrological modeling data. **07**

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