

# GUJARAT TECHNOLOGICAL UNIVERSITY

## CIVIL (WATER RESOURCES ENGINEERING) (33)

### HYDROLOGY AND WATERSHED MANAGEMENT

**SUBJECT CODE: 2711202**

**SEMESTER: I**

**Type of course: Applied hydrology**

**Prerequisite:** Knowledge elementary hydrology, rainfall-runoff relationship, hydrograph analysis, probability distribution, regression analysis, Stochastic and deterministic models

**Rationale:** The students will get equipped with understanding of various topics viz; stream gauging, flood routing, watershed management. Students are introduced with calculation of stochastic hydrology and various models in rainfall-runoff

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	PA (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	2	5	70	30	20	10	10	10	150

**Content:**

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Engineering Hydrology Hydrological cycle, precipitation, forms, measurement, distribution, storm pattern and analysis, Catchment characteristics for producing run-off, infiltration, rainfall-runoff relation etc, Hydrograph analysis, transportation of streams, stream gauging, measurement of stage, discharge, relationship, most probable flood standard project flood, Synthetic hydrograph, Flood routing	14	35
2	Watershed Management Watershed, Small Watershed, Characteristics of Watersheds-Size, Elevation & Slope, Aspect & Orientation, Watershed shape, Drainage Network; Watershed Equilibrium, Watershed improvement, method for reducing flood peaks, Soil conservation, Afforestation, channel improvement, detention basins, Water Harvesting	10	25
3	Stochastic Hydrology: Probability, Distribution of random variation, probability fitting, correlation and regression analysis, stochastic process, Time series analysis, Synthetic flow generation model	8	15
4	Catchments Models Stochastic and deterministic models, Conceptual and Emperical models, Dynamic and Numerical models, Single Event Rainfall-Runoff Models, Continuous Simulation Models, Model Calibration & Validation	10	25

**Reference Books:**

1. Hydrology & Soil Conservation Engineering – Ghansyamdas

2. Stochastic Water Resources Technology – N.T. Kottegoda
3. Applied Hydrology – Mutreja
4. Engineering Hydrology – K. Subramanya
5. Hydrology – Raghunath
6. Engineering Hydrology – J. Rami Reddy
7. Stochastic Hydrology – J. Rami Reddy
8. Applied Hydrology – Maidment & V. T. Chow
9. Introduction to Hydrology – Warren Viessman, Jr. & Garry L. Lewis, Pearson Education

**Course Outcome:**

After learning the course the students should be able to: understand the basic principles of hydrology. Hydrograph analysis. Water shed analysis and management. Simulation and modeling of surface water hydrology.

**List of Experiments :**

1. Use of automatic weather station
2. Measurement & analysis of Rainfall
3. Calculation of runoff
4. Measurement & analysis of Temperature
5. Measurement & analysis of Wind Velocity
6. Measurement and analysis of Moisture Content
7. Hydrograph analysis

**Open Ended Projects:**

1. Rainfall-runoff modeling
2. Application of hydrograph theory in design discharge and flood estimation
3. Flood routing

**Major Equipments:**

1. Rain gauges
2. Weather station
3. Rainfall simulator
4. Infiltrimeters

**List of Open Source Software/learning website**

[http://www.academia.edu/1468483/Hydrological\\_open\\_source\\_experiences\\_using\\_SWAT\\_and\\_OpenMI](http://www.academia.edu/1468483/Hydrological_open_source_experiences_using_SWAT_and_OpenMI)