GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (WATER RESOURCES ENGINEERING) (33)
Master of Engineering
Subject Code: 3723302
Semester – II
Subject Name: GROUNDWATER MANAGEMENT

Type of course: Core-III

Prerequisite: Fundamental knowledge of ground water hydrology, well hydraulics, ground water flow continuity equation, Darcy's law.

Rationale:
Students will be able to understand flow of ground water through porous media, recharge of aquifer and sea water intrusion in coastal aquifers

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	**0**	**2**	**4**	**70**	**30**	**30**	**20**	**150**

Content:

Sr. No.	Content	Total Hrs
1	Availability of ground water, types of aquifers, ground water investigation methods, aquifer parameters and their determination, development of ground water.	**12**
2	Well hydraulics, types of wells, multiple well system, well design criteria, construction and maintenance.	**12**
3	Groundwater basin management and conjunctive use, artificial recharge of aquifers, methods of artificial recharge	**8**
4	Sea Water intrusion in coastal aquifers, methods of its prevention and control, Groundwater pollution remediation and legislation	**8**
5	Introduction to ground water flow and contaminant transport process	**6**

Reference Books:

1. Groundwater Resources Evaluation – W. C. Walton
2. Geohydrology – Roger Dewlest
3. Groundwater Hydrology – D. K. Todd

4. Numerical analysis by Analog and Digital models for seepage and groundwater flows- D.R.Ruston & S.C.Redshow
5. Groundwater – H. M. Raghunath
6. Numerical ground water hydrology—A.K.Rastogi

Course Outcomes: At the end of the course, Student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand basic of ground water flow	20
CO-2	Understand well hydraulics & design of well system	25
CO-3	Understand conjunctive use of ground water & artificial recharge of aquifers	20
CO-4	Analyse types of ground water flow	25
CO-5	Analyse methods to prevent seawater intrusion and groundwater pollution	10

Suggested Specification table with Marks (Theory): (For ME only)

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10%	**20%**	**20%**	**20%**	**15%**	**15%**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

List of experiments: Based on syllabus

List of Open Source Software/learning website:

1. http://www.nptel.iitm.ac.in/courses/
2. http://en.wikipedia.org/wiki/Groundwater