

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL AND INFRASTRUCTURE ENGINEERING
PLANNING AND DESIGN OF URBAN WATER INFRASTRUCTURE
SUBJECT CODE: 2174016
B.E. 7th SEMESTER

Type of Course: Departmental Elective

Prerequisite: Fluid Mechanics and Hydraulics

Teaching and Examination Scheme:

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Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	PA(M)	Viva	PA (I)		
3	2	0	5	70	30	30	20	150

Contents:

Sr.No.	Topics	Hrs.	% Weight age
1	Module-I Introduction- Overview of Sources of Water: Hydrological concepts, Surface sources of Water and Sub Surface or Underground Sources.	2	05%
2	Module-II Intakes for collecting Surface Water: Definition and general introduction of Intake system, Factors governing the location of an Intake, Types of Intake- Simple Submerged Intakes, Intake Towers, and Medium sized River Intake Structures, Canal Intakes, and Intakes for Sluiceways of Dams.	8	20%
3	Module-III Conduits for Transporting Water: Various types of conduits, Hydraulics of Flow and Design of Pressure Pipe as Gravity Mains, Flow in Pipe Systems, Forces acting on Pressure Conduits, Various Types (Materials) of pressure pipes, Layout of Water Infrastructure supply pipes, Pipe Appurtenances, Testing of Water Mains (Pipelines). Pumps for lifting Water.	10	25%
4	Module-IV	10	25%

	Water Infrastructure Distribution system: Requirements of a good distribution system, arrangement of distribution pipes and other accessories, Layout of distribution networks, methods of distribution, pressures in the distribution system, systems of supply, distribution reservoirs, wastage of water in the distribution system- detection of leakage in the distribution pipes, design of distribution networks, Appurtenances in the Distribution system, Fire Hydrants, Water Meters.		
5	Module-V Water Supply Plumbing Systems in Houses and High Rise Buildings: Plumbing system in Water Supplies, The House Water connection, Stop cocks, Water Taps and Bib Cocks, Pipe fittings, Storage of Water in Buildings, Water Piping systems in Buildings, Design considerations for Water piping systems in Buildings, Hot water appliances and installations, domestic hot water appliances, solar water heaters, centralised hot water system.	10	25%
	Total	40	100

Reference Books:

1. SK Garg ,Water Supply Engineering, Environmental Engineering (Vol-I), Khanna Publishers
2. Ragunath. H.M., Hydrology, Willey Eastern Limited, New Delhi, 2000.
3. K.Subramanya (2004), Engineering Hydrology, Tata-McGraw Hill, New Delhi.
4. R Srivastava, A Jain (2017), Engineering Hydrology, McGraw-Hill Education(India), Chennai.
5. R.K.Bansal (2017), Fluid Mechanics and Hydraulic Machines, Ninth Edition, Laxmi Publications (P) Ltd.
6. Todd D.K., "Groundwater Hydrology", John Wiley & Sons, Inc, New York,
7. Bear J., "Hydraulics of Groundwater", McGraw-Hill, New York,
8. Irrigation, Water Resources and water power engineering-P. N. Modi ,Standard Book House,
9. Srivastava, R. (2008). Flow through Open Channels, Oxford University Press,
10. Ven Te Chow, David Maidment and Larry Mays (2001), Applied Hydrology, Tata McGraw Hill, New Delhi, India,
11. C.S.P. Ojha, R, Berndtsson and P. Bhunya, Engineering Hydrology, Oxford University Press, New Delhi,
12. R.A. Wurbs and W.P. James, Water Resources Engineering, Prentice Hall of India, New Delhi,
13. R.K. Sharma and T.K. Sharma, Hydrology and Water Resources Engineering, Dhanpat Rai Publications, New Delhi,
14. R.K. Linsley, J.B. Franzini, D.L. Freyberg and G. Tchobanoglous, Water Resources Engineering, McGraw Hill Singapore,
15. V.P. Singh, Elementary Hydrology, Prentice Hall, Englewood Cliffs, New Jersey.

Course Outcome:

After learning the course the students should be able to:

1. Conceptual understanding of Intake systems
2. Competence in planning and designing for upgradation of water infrastructure system in an urban set up
3. Planning and preparation of water supply projects.

4. Conceptual understanding of plumbing systems and appurtenances in the distribution systems.
5. Understanding of advanced methods of Leakage identification in distribution pipes.
6. Hands on training using HAESTAD- Hydraulics and Hydrology software (Bentley Systems).

List of Tutorials:

1. Water Demand Forecasting example problem
2. Flow in pipes of a distribution network by Hardy Cross Method
3. Intake system design problem
4. Fire Hydrants design problem
5. Water Meter design (Traditional design)
6. Water Meter Design (Advanced methods)
7. Leak Detection Design
8. Water Supply plumbing system design for an independent house
9. Water Supply plumbing system design for a High Rise building/ Township design
10. Planning and preparation of Water Supply projects using HAESTAD software tool.

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	25	25	15	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

List of Open Source Software/learning website: <http://nptel.ac.in/courses/105104102/15>

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.