

GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL ENGINEERING (17)

APPLICATION BASED SYSTEMS FOR TRANSPORT OF WATER & WASTEWATER

SUBJECT CODE: 2711701

SEMESTER: I

Type of course: :Numerical Methods/Application based systems

Prerequisite: Student shall have studied basics of water & wastewater engineering

Rationale: To provide knowledge related to the requirement of water and wastewater and its design

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	0	4	70	30	30	0	10	10	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	General hydraulics and flow measurement: Fluid properties; fluid flow – continuity principle, energy principle and momentum principle; frictional head loss in free and pressure flow, minor heads losses, Carrying Capacity–Flow measurement	8	19
2	Water Transmission and Distribution Need for Transport of water and wastewater-Planning of Water System –Selection of pipe materials, pipe thickness calculations. Water transmission main design- gravity and pumping main; Selection of Pumps- characteristics-economics; Specials, Jointing, laying and maintenance, water hammer analysis.	10	24
3	Water distribution System: Layout of distribution networks, methods of water distribution, storage capacity of ESR, and underground service reservoir, minimization of water losses, leak detection, Introduction to the use of computer software in water transmission, water distribution and sewer design	8	19
4	Wastewater collection and conveyance Planning factors, Design of sanitary sewer; partial flow in sewers, economics of sewer design; Wastewater pumps and pumping stations, sewer appurtenances; material, construction, inspection and maintenance of sewers; Design of sewer outfalls-mixing conditions; conveyance of corrosive wastewaters.	10	24
5	Storm Water Drainage Necessity, combined and separate system; Estimation of storm water runoff, Formulation of rainfall intensity duration and frequency relationships, Rational methods s	6	14

Reference Books:

1. “Manual on water supply and Treatment” by CPHEEO, Ministry of Urban Development, Government of India, New Delhi, Latest Edition.
2. “Manual on Sewerage and Sewage Treatment” by CPHEEO, Ministry of Urban Development, Government of India, New Delhi, Latest Edition.
3. Water Supply and Sanitary Engineering by G.S. Birdie and J.S. Birdie, Dhanpat Rai Publishing Co.- New Delhi
4. Wastewater Engineering: Treatment, disposal Reuse by Metcalf and Eddy, (Revised by G. Tchobanoglous) Tata-McGraw Hill, New Delhi
5. Practical Handbook on Public Health Engineering by Bajwa, G.S. Deep Publishers, Shimla, 2003
6. Water Supply and Pollution Control by Viesman, Hammer, Dun Donnelley Publisher, New York

Course Outcome:

After learning the course the students should be able to project the quantities of water and wastewater and its collection and conveyance methods

List of Exercises:

1. Numericals on various methods of Population Projection, water demand and waste water generation
2. Numericals on rapid sand filters, sedimentation, coagulation and flocculation, rapid sand filter
3. Design of Intake Structure
4. Estimation of storm water runoff
5. Aerobic & Anaerobic treatments of water and wastewater and its numerical

List of Open Source Software/learning website:

- <http://nptel.ac.in/>
- <http://elearning.vtu.ac.in/>