GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL ENGINEERING (13)
Subject Code: 3141312
Semester – IV
Subject Name: MUNICIPAL ENGINEERING

Type of course: Professional Core Course

Prerequisite: knowledge of hydrological cycle and its components

Rationale: To understand the water supply and sewage collection systems in cities

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)	
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Water supply scheme:** Importance & necessity of water supply scheme, Importance and reliability of water works, essentials of water supply engineering	2
2	**Sources of water**: Surface water sources, ground water sources and terminology related to ground water	6
3	**Quantity of water:** Type of demand. Per capita demand, design period, fluctuation in demand of water, factors affecting demand of water	2
4	**Pumps and Pumping stations**: Need of pumping, classification of pumps, different type of pumps used in water supply, power of pumping, total lift of pump, H.P of pump, location of pumping station, site selection.	4
5	**Collection and conveyance:** Intakes, type of intake, conveyance of water, different type of pipes used in water supply, pipe-joint, laying of pipe, hydrostatic test.	6
6	**Distribution system:** Type of distribution system, different layout of distribution system, methods of supplying water, pressures in distribution system, distribution resources and its capacity, type of reservoirs & accessories, design of distribution system, design of pipelines and	4

	analysis of complex pipe networks-Hard cross method.7	
7	**Valves and Fittings:** Different type of valves, hydrants, meters, stop cock & water tap, pipe fittings, leakage & waste of water factors, affecting losses & wastes.	**4**
8	**Sanitary works:** Definitions, sanitary works, objectives of sewage disposal	**2**
9	**Systems of sanitation** Methods of collection, conservancy systems, collection system, water carriage system, sewerage system	**2**
10	**Quantity of sanitary and storm sewage** Sources of sanitary sewage, factors affecting and determination of quantity of sanitary sewage, factor affecting storm sewage and determination of quantity of storm sewage	**4**
11	**Design of sewers:** Design period, per capita sewage flow, ground water infiltration, estimation of storm runoff, flow assumption, determination of velocity of flow	**6**
12	**Drains and sewers** Drains, sewers: sections, sewer material, sewer drawings, corrosion prevention in sewers	**2**
13	**Sewers appurtenances** Manhole, street inlet, flushing tanks, catch basins, inverted siphon, ventilation of sewers	**6**
14	**Construction and maintenance of sewers:** Lying of sewers, jointing of sewers, and hydraulic testing of pipe sewers, maintenance of sewers, sewer cleaning equipments and devices.	**4**
15	**House plumbing:** Terms, Plumbing tools, traps and system of plumbing	**2**

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

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
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.

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Reference Books:

1. Water supply and sewege system – G. S. Birdie
2. Water Supply & Sewage Systems - K.N. Duggal
3. Water Supply & Sewage Systems – S. K. Garg
4. Water Supply and Sanitary Engineering – Rangwala

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Identify the sources of water considering the quantity and quality.	20
CO-2	Explain the components of water supply scheme including intakes, pipes, pumping systems, distribution system, valves and fittings.	30
CO-3	Design construction and maintenance of the sewers considering the quantity of storm water and sewage.	25
CO-4	Describe the concept of sewers, sewer systems, sewer appurtenances, drains and plumbing.	25

List of practicals /exercises:

Following activities shall be performed during laboratory hours: (minimum 10 need to be carried out)

1. To collect drinking water samples and check drinking water quality parameters as per IS :10500.
2. To determine residual chlorine from tap water.
3. To compute daily/seasonal water demand of institute/society/industry.
4. To conduct a survey of leakages from pipelines and water taps
5. To find out sewage quantity of village/city (based on sewage pumping data).
6. To determine the quantity of storm water of village/city.
7. To prepare report on water distribution system based on survey.
8. To visit & prepare a detailed report on water treatment plant of the city.
9. To prepare sketches of plumbing fittings and sewer appurtamces.
10. To prepare sketches of valves and pipe fittings.
11. To prepare sketches of distribution system.
12. The students will have to solve examples based on pumps.
13. The students will have to solve examples based on reservoir capacity.
14. The students will have to solve examples based on design of pipe network (Hardy cross method)
15. The students will have to solve examples based on design of sewers.

List of Open Source Software/learning website:

1. NPTEL - https://nptel.ac.in
2. CPHEEO: Manual on Water Supply and Sewerage System- cpheeo.gov.in