



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Engineering

Level: Diploma

Branch: Environmental Engineering

Course / Subject Code : DI01C13011(Only for C to D Students)

Course / Subject Name : Water Supply and Sewerage System

w. e. f. Academic Year:	2024-25
Semester:	1st
Category of the Course:	PCC

Prerequisite:	Basic Science knowledge
Rationale:	Water is an integral component of our life and major constituent of our body and also planet earth. Water is available in various forms on earth's surface but it involves various mechanism to supply it to consumers and also to collect waste water generated. Therefore, Water supply and Sewerage system is an integral part of any environmental engineering project. However, if they are not well designed and maintained then it may lead to water contamination and other type of pollution. Therefore, knowledge and understanding of water supply and sewer system and to ensure quality in their construction is very important for engineers working at site to avoid water contamination and pollution in future. This course attempts to develop knowledge and skills for designing and execution of water and sewerage system and also imparts knowledge about water distribution and sewerage collection. Every environmental engineer should try to develop mastery over this course.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Evaluate various sources of water in terms of quantity and quality.	R,U,A
02	Estimate the water demand considering future projection of population.	R,U,A
03	Explain the components of water supply scheme including pipe network, distribution systems, valves and fitting.	R,U,A
04	Estimate the quantity of sanitary and storm sewage.	R,U,A
05	Explain essential features of various types of sewers and sewer appurtenances.	R,U,A

*Revised Bloom's Taxonomy (RBT)



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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial / Practical	
			ESE (E)		PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Sources Of Water and its Demand Sources of surface water (river streams, lakes, ponds), Sources of sub surface (Springs, wells), Ground water yield and its measurements Define hydrology, it's importance in generation of runoff, Various types of water demand, Factor affecting per capital water demand, Standard methods of forecasting population: Arithmetical increase method, Geometrical increase method, Incremental increase method, Decrease rate of growth method, Graphical Method	10	25
2.	Collection and Conveyance Types of intakes, Design of intakes, Conveyance of water, Different types of Joints in pipe network, Use of hydraulic design of pressure pipe, Compute losses of head in pipe, Methods of laying of pipes and sewer line, its tests for straightness, water tightness and smoke test.	8	20
3.	Water Distribution System Types of Distribution system, Gravity system, Pumping system, Dual system Layout of Distribution system, Requirement of a Distribution system Method of supplying water, Types of Distribution Reservoirs.	9	10



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4.	Sewer System and Quantity of Sewage Aims and objectives of sewer disposal system, Types and Characteristics of Sewer Materials, State and classify systems of sanitation, Methods of sewage collection with their merits and demerits, Sewage conveyance system Patterns of collection of sewage, Evaluate sources of sanitary sewage Roll of infiltration in addition of sanitary sewage, State and explain subtraction allowances, Methods of determination of quantity of sanitary sewage, Variation in quantity of sewage, Methods of determination of quantity of storm water	8	20
5.	Construction And Maintenance Of Sewers Method of laying of sewers, Jointing of sewers, Methods of Hydraulic Testing of pipes and sewers, with specifications, Necessity of maintenance of sewers, Causes of damage to Sewers, Problems in sewer maintenance, Define “Appurtenances” and its necessity, For the operation and maintenance of sewerage system various devices : Manholes and Inspection Chambers Hazards of Manhole Work, Drop manholes, Lamp holes, Street Inlets, Flushing tanks, Inverted siphon, Storm water relief work, Design of Overflows and Regulators, Ventilation Pipes.	10	25
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
40	40	20			

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

S. No.	Title of Book	Author	Publication
1	Water supply and sanitary engineering	S.C. Renewal	Charotar publication
2	Water supply and sanitary engineering	G.S. Birdie	Dhanpat rai publication
3	Water Supply Engineering	S.K.Garg	Khanna Publishers



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S. No.	Title of Book	Author	Publication
4	SP-35(Handbook on Water Supply and Drainage (With Special Emphasis on Plumbing)	BIS	BIS
5	Manual on sewerage and sewage treatment systems	CPHEEO (Central Public Health and Environmental Engineering Organization)	CPHEEO, New Delhi
6	Manual on water supply and treatment	CPHEEO (Central Public Health and Environmental Engineering Organization)	CPHEEO, New Delhi

(b) Open source software and website:

- www.cpheeo.gov.in
- www.nptel.ac.in
- www.gpcb.gov.in
- www.gwssb.org
- www.cpcb.nic.in
- www.neeri.res.in

- Rahul Dubey, “An Introduction to Internet of Things: Connecting Devices, Edge Gateway, and Cloud with Applications”, Cengage India Publication
- Raj Kamal, “Internet of Things: Architecture and Design Principles, Mc Graw Hill Education
- Hanes et al “IoT Fundamentals”, Cisco Press
- Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, Paperback, 2015.
- McEwen, H. Cassimally, “Designing the Internet of Things”, Wiley, 2013.
- Yashwant Kanetkar, “21 Internet of Things Experiments”, Kindle edition
- Adeel Javed, “Building Arduino projects for Internet of Things”, Apress publication



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- Donald Noris, “The Internet of Things: Do it yourself Projects with Arduino, Raspberry PI and BeagleBone Black” Mc Graw Hill Publication
- Adrian McEwen & Hakim Cassimally, “Designing the Internet of things”, Willey publication
- Rahul Dubey, “An Introduction to Internet of Things: Connecting Devices, Edge Gateway, and Cloud with Applications”, Cengage India Publication
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Suggested Course Practical List:

S. No.	Practical List	Unit No.	Approx. Hrs. required
1	Study of sources of water and w/w and problem based on this topic	I	02
2	Study the factors affecting quantity of water. Solve problems based on population forecasts and average precipitation run off	I	04
3	Study based on collection and conveyance of water and problems based on this	II	02
4	Solve problems based on water distribution system	III	02
5	Design water supply system in multi-story building	III	04
6	Design water supply system for a small housing society	III	04
7	Solve problem based on estimation of sewage quantity.	IV	02
8	Study of construction and maintenance of Sewers	V	02
9	Study and drawing of sewer appurtenance	VI	04



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S. No.	Practical List	Unit No.	Approx. Hrs. required
10	Design sewer system for a small housing society	V	04
			Total: 30

Suggested Project List:

- Prepare a chart showing various sources of water.
- Study water supply scheme of a multistory complex or a small housing society. Prepare a report on it and discuss its merits and shortcomings.
- Study sewer system of a multistory complex or a small housing society and prepare a report on it and discuss its merits and shortcomings.
- Visit a nearby water treatment plant and prepare a report indicating the Methods adopted, its capacity, amount of different chemicals and energy used and the quality of water produced for domestic use.
- Visit a nearby water treatment plant and evaluate the performance of water treatment plant as per the checklist provided by GWSSB (Gujarat water supply and sewerage board).
- Visit a nearby sewage treatment plant and prepare a report indicating the methods adopted, its capacity, amount of different chemicals and energy used.
- Visit a nearby sewage treatment plant and prepare a report indicating the quality of water discharged in the environment.
- Prepare a list of IS related to Water Supply and Sanitary engineering.
- Prepare a report on odour control technologies available for sewerage system.
- Prepare a chart depicting various Sewer Appurtenances.

Suggested Activities for Students:

Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a) Study the water distribution system of residing city and list its merits and demerits
- b) Study the Sewage collection system of residing city and list its merits and demerits
- c) Undertake micro-project.
- d) Give seminar on any relevant topic.

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