SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Master of Technology
Environmental Engineering

M. Tech. I Semester I

Subject Name: Environmental Hydraulics **Subject Code:** MTEN14105

Type of course: PE-II
Prerequisite: Basics of Water & Wastewater Engineering

Rationale: To develop a basic knowledge about the concept of transport of water and wastewater and apply the same in the field application. To educate the students in detailed design concepts related to water transmission mains, water distribution system, sewer networks and storm water drain, with emphasis on computer application.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Introduction of Hydraulics:** Fluid properties, Types of fluid flow, Continuity principle, energy principle and moment principle, Flow through pipes and head losses, Flow measurement, Venturimeter, Orifice meter, Notches.	08	20%
2.	**Water Distribution and Transmission Design:** Need for transport of water and wastewater, pipe network, water transmission main design, Gravity and Pumping, Water Hammer Analysis, Water distribution networks, Analysis of water distribution system, Storage capacity of reservoir.	10	25%
3.	**Sewerage System Design:** General design Principle of sewer, Method of Collection of sewer, Layout and design of municipal sewer, sewer appurtenances, sump well and sewage pumping, Recent development in sewerage system design, maintenance of sewers.	12	25%
4.	**Urban Storm Drainage:** Introduction to drainage problems in difficult climates, Planning concepts Necessity, combined and separate system, Estimation of storm water runoff, Formulation of rainfall intensity duration and frequency relationships, Rational method, Rainwater Harvesting,	06	15%

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	Urban storm pollution.		
5	**Application of Software in Water and Sewer Design:** WATERGEMS, SEWERGEMS, EPANET	06	15%

Suggested Specification table with Marks (Theory/Practical):

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

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **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.

Reference Text Books:

Sr no	**Title of book /article**	**Author(s)**	**Publisher and details like ISBN**	**Year of publication**	**Publication Edition**
1	Water Supply and Sanitary Engineering	G.S. Birdie and J.S. Birdie	Dhanpat Rai Publishing Co.- New Delhi	2011	Nine
2	Wastewater Engineering: Treatment, Disposal Reuse	Metcalf and Eddy, (Revised by G. Tchobanoglous)	Tata-McGraw Hill, New Delhi	2003	Fourth
3	"Manual on Water Supply and Treatment"	CPHEEO	Ministry of Urban Development, Government of India, New Delhi, Latest Edition.	1999	Latest
4	Manual on Sewerage and Sewage Treatment Systems	CPHEEO	Ministry of Urban Development, Government of India, New Delhi, Latest Edition.	2013	Latest
5	Flow in Open Channel	K Subramanya	McGraw–Hill Book Company, International editions,New Delhi	2019	Fifth

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Course Outcome:

Sr. No.	CO statement	Marks % weightage
CO-1	To make them understand the fundamentals of hydraulic engineering and the various fluids flow phenomenon.(R,U,N cognitive level)	20
CO-2	To design sewer network and water supply distribution network for various field conditions(U, E,N cognitive level)	25
CO-3	To troubleshoot water and sewage transmission (R,U,C cognitive level)	20
CO-4	To improve the knowledge on the planning and estimation of storm water flow (N, A cognitive level)	20
CO-5	To use various computer software for the design of water and sewage network(E,A cognitive level)	15

List of Practicals:

1. Numerical on various methods of Population Projection, water demand and waste water generation
2. Design of water distribution network by hardy cross method
3. Design of Sewer Network
4. Estimation of storm water runoff
5. Basic Application of WaterGEMS and SewerGEMS for water distribution and sewage network

List of Open Source Software:

1. Sewer-GEMS
2. Water-GEMS
3. EPANET

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