COURSE CODE: **ENE- 406**

COURSE NAME: **WATER SUPPLY AND WASTEWATER ENGINEERING**

CREDIT HOURS:
Theory = 02
Practical = 01
Total = 03

CONTACT HOURS:
Theory = 32
Practical = 48
Total = 80

PREREQUISITE: Nil

MODE OF TEACHING:

Instruction:	Two hours of lecture per week	67%
Practical:	Three hours of Lab work per week	33%

COURSE DESCRIPTION:

This course comprises of two major parts. First part provides knowledge and understanding about water supply distribution system and design under the considerations of hydraulics and water quality measures to fulfil the community needs both quantity and quality. Second part focuses on the design of wastewater collection, treatment system including septic tank, stabilization pond, sludge management, sewage disposal plant and finally techniques for the safe disposal of wastewater.

COURSE OBJECTIVES:

The objective of this course is to familiarize students with the in-depth knowledge of water supply system design, water treatment and distribution networks. Moreover, to provide students with the basic concepts of the sanitation system and the principles of wastewater treatment systems to analyze the suitable design of safe wastewater collection and disposal system.

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students will achieve the PLOs:

1	Engineering Knowledge:	☑	7	Ethics:	☐
2	Problem Analysis:	☑	8	Individual and Collaborative Team Work: :	☐
3	Design/Development of Solutions:	☑	9	Communication:	☐
4	Investigation:	☐	10	Project Management:	☐
5	Tool Usage:	☐	11	Lifelong Learning:	☐
6	The Engineer and Society:	☐			

COURSE LEARNING OUTCOMES:

Upon successful completion of the course, students will be able to:

No.	CLO	Domain	Taxonomy Level	PLO
1	Describe basic concepts of water supply distribution and wastewater collection system.	Cognitive	2	1
2	Analyze different mechanisms/components of water	Cognitive	4	2

	supply distribution and wastewater disposal system to identify and resolve the problems and motives for efficient system.			
3	Apply models to design water supply and wastewater collection system.	Cognitive	3	3

PRACTICAL APPLICATIONS:

This course provides an elementary introduction to the water supply and wastewater system and provides the basic mechanism necessary for the detailed study of both components. This course aims to provide an understanding of water supply system with population, quality of water and the importance of water quality in both water supply and wastewater systems.

TOPICS COVERED:

Theory:

Week	Topics
1	**Part-1: Water Supply** Sources of Water Supply Types, Types of well construction, Yield of well, Test for yield of well etc.
2	Water quantity and population forecasting
3	Water consumption for various purposes and its estimations,
4-5	Layout and design of water distribution systems, Storage Capacity, Fixtures and their installation, Flow in pipes.
6	Assessment of water quality, Supply Sampling and Testing
7-8	Treatment of surface & ground water, screening, sedimentation, coagulation, filtration, Water disinfections and chemicals, Use of chlorine, quantity, dosage & efficiency, Emergency treatment methods.
9	**Part-2: Waste Water Engineering:** Introduction of wastewater collection system
10-11	Design of wastewater collection system
12-13	Hydraulics of sewers, Design of sanitary and storm sewers.
14	Wastewater Treatment System- Septic Tank.
15-16	Waste Stabilization Pond (WSP), Principle and types of WSP, Design of WSP.
17	Sludge management.
18	**ESE**

Practical:

No.	Topic
1	Manual Drawing of water distribution network for community
2	Calculating nodal demand at each node
3	Introduction to WaterGEMs
4	Drawing network in WaterGEMs
5	Analysis of water distribution system
6	Calculating flow in pipes
7	Introduction to SewerGEMs
8	Drawing wastewater collection network in SewerGEMs
9	Wastewater treatment technique based on natural system constructed wetlands and filtration plant.

TEXT AND MATERIAL:

Textbook(s)

a. Water Supply and Sewerage (6th Edition) by E.W. Steel and Terence J. McGhee, McGraw Hill Book Company, 1991.
b. Wastewater Treatment for Pollution Control and Reuse, (3rdEdition) by Arceivala, 2006.

Reference Books

a. T. Environmental Engineering by Peavey. H.S. RR & George
b. Water supply & Sanitary Engineering by KulKarni.

ASSESMENT SYSTEM:

1. **CLOs Assessment**

Cognitive	**Psychomotor**	**Affective**
Spreadsheet	Rubrics	-

2. **Relative Grading**

Theoretical / Instruction			67%
	Assignments 10%		
	Quizzes 10%		
	Mid Semester Exam 30%		
	End Semester Exam 50%		
Practical Work			33%
Laboratory Work		*70%*	
	Laboratory Attendance 20%		
	Laboratory Report 20%		
	Laboratory Quiz 30%		
Viva/Quiz		*30%*	
Total			**100%**