FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF

CIVIL ENGINEERING

Marwadi University Marwadi Chandarana Group NAAC A+

Pipeline Engineering

01CI0815

Objective of the Course:

- To design economical the water supply project.
- To provide a safe, regular, and enough water supply to the community.
- To know the hydraulics involved in the water distribution system.
- To understand various pipe fittings and materials

Credit Earned: 03

Prerequisite: Basics of Fluid Mechanics and Hydraulics

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Compute the economic diameter of the rising main for the water supply system.
2. Design of water distribution system using LOOP/WATER GEMS
3. Calculate the capacity of the Elevated Storage Reservoir.
4. Describe different pipe materials and lining-coating requirements.
5. Explain pipe laying, jointing, and testing of pressure as well as non-pressure pipe.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr. No	Topic name	Hours
1	**Hydraulic Design of Rising Main**	**10**
	1.1 Introduction of Rising main, Hydraulic design Formula	02
	1.2 Head losses in pipes	02
	1.3 Design Criteria of distribution system such pressure, velocity, minimum diameter of pipe, etc	02
	1.4 Types of pumps and its selection	02
	1.5 Rising main design and economic analysis	02

2	**Water Distribution System**	**10**
	2.1 Peak factor, continuous and intermittent water supply	01
	2.2 Analysis of flow in WDS	01
	2.3 Analysis of pipe network by various methods	01
	2.4 Software used for the design of WD: LOOP/WATER GEM/EPANET	06
	2.5 ESR mass balance	01
3	**Pressure Transient and Water Auditing**	**08**
	3.1 Water hammer, Surge Pressure and analysis and its calculation	02
	3.2 Remedial measure for water hammer and devices used to control water hammer, use of thrust block	02
	3.3 water audit, Online monitoring and control system	02
	3.4 Leakage detection in pipeline	02
	3.5 Burst detection techniques	02
4	**Pipes and Appurtenances**	**06**
	4.1 Factor to consider selection of pipe materials, Types, of pipe, corrosion	02
	4.2 Lining and coating of pipe	01
	4.3 Types of Valves and its usage	02
	4.4 Horizontal and vertical bends, flow meter	01
5	**Pipe Laying, Jointing and Testing**	**08**
	5.1 System Test Pressure	01
	5.2 Exaction, bedding, lowering, and handling of pipes	01
	5.3 Types of joints, Testing of pressure pipe and none pressure	02
	5.4 Welding techniques, Design, and procedure qualifications	02
	5.5 Testing of welding joints by Non-destructive testing methods	02
	TOTAL	**42**

List of Assignments/Tutorials

Sr. No	Topic name
1	Compute economical dia and power requirement of rising main.
2	Design of water distribution network.
3	Evaluate pressure transient and water auditing.
4	Use of pipes and their fittings.
5	Laying, jointing, and testing of pipes.

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	20%	45%	15%	10%	5%

Instructional Method and Pedagogy:

1 Prerequisites of the course and its pattern shall be discussed at the commencement of the course.
2 Lectures shall be conducted in the classroom using various teaching aids.
3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
4 A minimum of two internal exams will be conducted and an average of two will be considered as a part of a 15% overall evaluation.
5 At the end of each unit/topic, an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.
6 The assignments/tutorials/technical visits are planned in such a way that they cover the practical aspects of the course contents.

Recommended Study Material

1. Analysis of Water Distribution Network by P. R. Bhave and R. Gupta
2. Water supply and sanitary engineering by G.S.Birdie and J.S.Birdie
3. Environmental engineering by H.S. Peavy, D.R.Row & G.Tchobanoglous
4. CPHEEO Manual on water supply and treatment
5. IWWA Manual on Design and Selection of pipes for water supply
6. IS 3589 latest edition
7. IS 5504 latest edition