Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-7 (B. Tech.)

Subject: Design of Water Supply Conveyance– BETCV17339
Type of Course: Professional Core
Prerequisite: Knowledge of Fluid Mechanics & Environmental Engineering

Rationale: To build a strong foundation in the field of water supply engineering and its conveyance systems, ensuring safe, reliable, and sustainable delivery of water to consumers. To enable students to apply fundamental principles of hydraulics and water treatment in the planning and design of water supply schemes and distribution networks. To equip students with the knowledge required for efficient operation, maintenance, and management of water supply systems in urban and rural areas. To prepare students for assessing water demand, designing conveyance structures, and evaluating the performance and reliability of water distribution systems.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. No.	Course Content	Hrs.	% Weightage
1	**Sources, Quality and Demand of water** Importance and necessity of water supply Engineering, Sources of water, Suitability of water, Choice of source, Types of demand, Population forecast, Computation of quantity of water, Fluctuation in demand, Factors affecting demand, Impurities in water, Collection of water sample, Physical Chemical and Biological tests, Standards of quality of water	10	15
2	**Treatment of Water Treatment of Water** Objectives of water treatment, Location of water treatment plant, Layout of water treatment plant, Basic principles of working of treatment plant, Various stages of treatment of influent water, Functioning of Coagulation treatment plant, Sedimentation, Filtration, Disinfection, Water Softening	10	15
3	**Conveyance of Water** Types of pipes used for conveyance, Pipe joints, Laying of Pipes, Distribution system, Types of valves, Types of Meters, Pipe fittings and fixtures, Necessity, Methods to prevent leaks, Measures for conservation of water	15	25
4	**Advanced Water Distribution Design Approaches** Sectorization of distribution networks; DMA Demarcation; Advantages and risks; Software for network design (WaterGEMS and EPANET), Automation: Automation in water supply, Real time monitoring and control, SCADA, Case studies of WTP automation, Automation in distribution systems, Concept of Smart Water Supply System for India cities	15	25
5	**Water Economics and Pricing** Economics of water supply systems, Calculation of investments and operational costs, Cost optimization, Approaches of water metering; Water pricing for sustainability, Pricing water in context to Indian cities, Issues and approaches, Existing water pricing models, Case studies	10	20

Continuous Assessment:

Sr. No.	Active Learning Activities	Marks
1	**Pipe Material Comparison Study** Students will be assigned by the faculty to compare different types of pipes based on cost, durability, and applications in construction. They will analyze the characteristics and suitability of each type for various conditions. Based on their study, each student shall prepare a detailed report. The final report must be uploaded on the GMIU web portal	10

2	**Smart Water Supply Case Study** Students will be assigned by the faculty to analyze smart water projects in any city, considering all relevant parameters such as technology used, efficiency, sustainability, and management practices. Based on their analysis, students shall prepare a structured PowerPoint presentation. They will present their findings to enhance understanding and communication skills. Faculty will guide and evaluate the work based on content and analysis. The final presentation must be uploaded on the GMIU web portal within the prescribed time.	10
3	**Design of Water Supply Network** Students will be assigned by the faculty to work in groups to design a water supply system for a selected area using suitable software. They will perform a detailed cost analysis considering materials, labor, and operational aspects. Based on their work, students shall prepare a comprehensive and well-structured report. The final report must be uploaded on the GMIU web portal.	10
TOTAL		**30**

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage %	10%	20%	20%	20%	10%	20%

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.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Apply principles of water supply engineering to evaluate sources, estimate demand, and assess water quality as per standards.
CO2	Analyze and design appropriate water treatment processes based on raw water characteristics and required quality standards.
CO3	Design and evaluate water conveyance and distribution systems using suitable materials, components, and leakage control measures.
CO4	Apply modern tools and techniques such as EPANET and automation systems like SCADA for efficient water distribution management.
CO5	Evaluate economic aspects, cost optimization, and sustainable pricing strategies for water supply systems in practical scenarios.

List of Practical

Sr. No.	Descriptions	Unit No.	Hrs.
01	Collect and preserve water samples from different sources as per standard procedures.	1	02
02	Determine physical properties of water such as turbidity, color, and temperature.	2	04
03	Analyze chemical properties of water including pH, alkalinity, and hardness.	2	04
04	Evaluate biological quality of water using MPN test.	2	02
05	Perform jar test to determine optimum coagulant dose for water treatment.	2	02
06	Study sedimentation process by observing settling characteristics of particles.	2	04
07	Measure discharge and head loss in pipes to study flow characteristics.	3	04
08	Study different types of pipes, joints, valves, and fittings used in water conveyance systems.	3	04
09	Calculate capital and operational cost of a water supply system.	5	02
10	Design a simple water metering and billing system for a locality.	5	02
TOTAL			**30**

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

[1] Text book of water supply & Sanitary, Engg. S.K.Hussain, Oxford & IBH
[2] A Text book of water supply & Sanitary Engg, S.K.Garg, Khanna Publishers
[3] Water supply & Sanitary Engineering, Birdie G.S., Dhanpatrai &Sons
[4] Water pollution & Disposal of Waste Water on Land, U.N.Mahida, Tata McGraw Hill
[5] Water and Waste water Engineering Gorden, Fair& Gayer Okun, John willey& Sons