



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-5 (Diploma)

Subject: Water and Waste Water Engineering – DETCV15216
Type of course Professional Core
Prerequisite: Knowledge of Water Resources Engineering

Rationale: Water and wastewater management are critical components of sustainable urban development and public health. This course is designed to provide civil engineering students with comprehensive knowledge and technical skills required to understand, analyze, and address challenges related to water quality, treatment, and wastewater management.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	0	0	3	60	30	10	00	50	150

Legends: CI-Class Room 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	Water Supply System Components and layout of water supply scheme, Sources of water, Types of water demand, Estimation of quantity of water required, Collection and conveyance of water, Quality characteristic of drinking water, Drinking water standard, Water borne diseases	05	20
2	Water Characteristics & Treatment Quantity and Source of water, intakes, Indian standard for drinking water, Water Quality Parameters: pH, Alkalinity, Electrical conductivity, Taste, Odor, Colour, Solids, Turbidity, Hardness, Plate counts and Most probable number (MPN), unit operations for water treatment, plain sedimentation, aeration, sedimentation tank and its design, flocculation, coagulation, filtration, disinfection, softening, ion exchange and adsorption.	10	25
3	Distribution System Water storage and distribution system, Distribution system: components, type of layouts, determination of capacity of elevated reservoirs, The Water (prevention and control of pollution) Act-1974	05	10
4	Waste Water Supply System Principles of house drainage, Pipes and traps, Classification of traps: nahni trap, gulley trap, interception trap, grease trap, Sanitary fitting, System of plumbing, House drainage plan for building, Type of sewerage systems: combined and separate, Quantity of Sewage, Sewage flow variations. Conveyance of sewage: Sewers, shapes design parameters, laying and testing of sewer, Sewer appurtenances.	10	20
5	Waste Water Characteristics & Treatment Pollution of Natural Waters, Emission and receiving body standards. Stream pollution, Ocean disposal. Waste Water Characteristics: Chemical oxygen demand (COD), Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Ions like chloride, fluoride, sulphate, Nutrients i.e. nitrogen and phosphorous. Treatment Fundamentals: Flow-sheets, physico-chemical and biological processes for water quality control, Process dynamics and reaction, Screens comminutors. Grit chambers, sedimentation, equalization, floatation and chemical treatment. Biological Treatment Processes: Aerobic and anaerobic, suspended – growth and attached – growth treatments. Types, modifications. Activated – sludge unit, trickling filters, Aerated lagoons, stabilization ponds, oxidation ditches. Aerators. Theory of	15	25

sludge Handling and disposal. Low-cost sanitation system: septic tanks, soak pit, stabilization ponds.		
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Continuous Assessment:

Sr. No.	Active Learning Activities	Marks
1	Water Quality Testing Students are individually collect local water samples and test for parameters such as pH, turbidity, hardness, and residual chlorine using standard testing kits or instruments. And Upload report in GMIU Web portal.	10
2	Poster Making on Wastewater Treatment Students are in Group create posters explaining various wastewater treatment stages, such as primary, secondary, and tertiary treatment and Upload a Poster in GMIU Web Portal.	10
3	Presentation on Urban Water Challenges Students are in Group issues such as water scarcity, contamination, and management in urban areas, followed by class presentations. Make presentation on it and upload GMIU Web Portal.	10
4	Visit to Water Treatment Plant visit to a municipal water treatment facility where students observe real-time processes like coagulation, sedimentation, filtration, and disinfection. And make a report on it and upload on GMIU Web Portal.	10
5	Make a plan of Water Treatment plant Faculty will assign Different types of Dimension then Students are make individually Draw a plan of water treatment plant on A2 Size sheet and upload the Sheet Photo on GMIU Web portal.	10
TOTAL		50

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 %	25%	30%	20%	10%	05%	10%

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	Evaluate water quality parameters and analyze their compliance with Indian drinking water standards.
CO2	Optimize water treatment units and distribution systems to ensure safe water supply
CO3	Analyze wastewater characteristics and select appropriate treatment methods for pollution control.
CO4	Assess the performance of physical, chemical, and biological wastewater treatment systems.
CO5	Design, test, and maintain sewerage systems considering hydraulic and operational requirements.

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] Wastewater Engineering: Treatment and Resource Recovery — Metcalf & Eddy, McGraw-Hill Education
- [2] Environmental Engineering: Water, Wastewater, Soil and Air — Mackenzie L. Davis, McGraw-Hill Education
- [3] Wastewater Treatment: Concepts and Design Approach — G. L. Karia and D. R. Christian, Prentice-Hall
- [4] Introduction to Environmental Engineering and Science — Gilbert M. Masters and Wendell P. Ela, Pearson
- [5] Manual on Sewerage and Sewage Treatment — Central Public Health Engineering Research Institute (CPHEERI), Ministry of Urban Development, Government of India

