

Branch Name:	Environment Engineering
Program Code:	ET212
Subject Title:	Industrial water and Wastewater Treatment
Subject Code:	2ET2120201T
Pre-requisite Subject:	Basic Knowledge of water and wastewater parameters & Basic concepts regarding water and wastewater treatment units

Course Objective:

- Student should acquire knowledge related to the requirement of water and wastewater treatment technologies and its design.
- Understand the industrial process, water utilization and waste water generation.
- Impart knowledge on selection of treatment methods for industrial wastewater.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1.	Introduction and Standards: Sources of Pollution: Physical, Chemical, Organic and Biological properties of Industrial Wastes , Differences between industrial and municipal waste waters , Industrial wastewater and environmental impacts, Regulatory requirements for treatment of industrial wastewater ,Toxicity of industrial effluents, Quality and quantity of industrial wastes, Treatment of water for cooling and Heating and steam generation. Difference between Criteria & Standards, Stream Standards, Effluent Standards, and Relevant Indian Standards for Disposal in to different Sinks.	10	23
2.	Flow Measurements, Characterization and Treatability Studies of Industrial Wastewater: Measurement of Flow, Collection and Preservation of Samples, Nature and characteristics of industrial wastewater.	4	10
3.	Waste Reduction: Methods of volume reduction, Strength reduction, Neutralization, Equalization and proportioning as related to Industrial waste treatment, Radio Active Waste and Treatment.	8	21
4.	Pollution Control in Industries: Origin, Characteristics and Treatment of major Industrial waste -Textile mill waste, Dairy waste, Sugar mill waste, fertilizer plant waste, pulp & paper Tannery waste, Petrochemical Complex Wastes, Pharmaceutical wastes, Vegetable and Food Industry, Dye Industry.	10	23
5.	Effluent treatment and Sludge Management: Individual and Common Effluent Treatment Plants , Joint treatment of industrial and domestic wastewater,	10	23

	Zero effluent discharge systems, Quality requirements for Wastewater reuse , Industrial reuse , Present status and issues Disposal on water and land, Residuals of industrial wastewater treatment, Quantification and characteristics of Sludge , Thickening, digestion, conditioning, dewatering and disposal of sludge		
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Reference Books:

1. Industrial Water Pollution by Nelson L. Nemerow - Addison Wesley Pub. Co.
2. Treatment of Industrial Waste by E.B. Besselièvre and M. Schwartz - McGraw Hill, Kega Kusha Ltd. Publication (latest), International Student Edition
3. Industrial water Quality W. W. Eckenfelder, Jr. Davis L. Fford, Andrew Englande McGraw Hill Publishing Co. (2009 ed)
4. Water Quality and Treatment Hand Book of Public Water Supplies by AWWA - McGraw Hill
5. Industrial Waste Treatment by Gurnham
6. Industrial waste water treatment by A.D. Patwardhan by PHI learning Private ltd.

List of Open Source Software/learning website:

1. <https://nptel.ac.in/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO-1	Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation	L-2
CLO-2	Understand the industrial process, water utilization and wastewater generation.	L-2
CLO-3	Impart knowledge on selection of treatment methods for industrial wastewater.	L-3
CLO-4	Acquire the knowledge on operational problems of common effluent treatment plants.	L-4
CLO-5	Able to project the quantities of water and wastewater and its collection and conveyance methods	L-5

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	M			M	M				M				M	M	
CLO2	M			M	M				M				M	M	
CLO3	M		M	M					M				M	M	
CLO4	M	M	M	M					M				M	M	M
CLO5	M	M	M	M					M				M	M	M

H: High, M: Medium, L: Low