Course Type	Course Code	Name of Course	L	T	P	Credit
DE	ESD402	Industrial Wastewater Engineering	3	0	0	9

Course Objective
Course Objective
To comprehend the significance of water efficiency and waste minimization in industrial sectors.
Learning Outcomes
Upon successful completion of this course, students will be able: Identify industrial waste stream characteristics from major industrial categories Understand the significance of these characteristics for design of unit processes Develop an overall treatment strategy for any industrial waste stream

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Sources and characteristics of industrial wastewater: management of Industrial wastewater, volume reduction, neutralization, equalization and proportioning, treatment and disposal	6	To understand fundamentals of wastewater operation
2	Advanced treatment process: Chemical Precipitation, Ion exchange, Adsorption, Membrane Filtration, Air Stripping, Electro-dialysis, Chemical Oxidation Processes, Advanced Oxidation processes.	10	To get familiarise with various unit operations in water and waste water treatment
3	Environmental issues for specific industries: Chlor-alkali, electroplating, distillery, dairy, tannery, paper & pulp, textile, dye, fertilizer, refinery, pharmaceutical, iron & steel, coke ovens, coal washeries, mining.	19	To demonstrate the real-world challenges
4	Design, operation and maintenance aspects of Industrial complexing for zero pollution attainment and Common effluent treatment plant (CETP)	7	To understand the need and importance of Zero Discharge

Recommended Text Book

1. W.W. Eckenfelder, Jr., Industrial Water Pollution Control 3rd Edition, McGraw-Hill, 1999.
2. Water Environment Federation(WEF), Industrial Wastewater Management, Treatment, and Disposal, 3rd Edition, WEP press, 2008.
3. Metcalf and Eddy, Inc, T. Asano, F.L. Burton, H. Leverenz, R. Tsuchihashi,G. Tchobanoglous. Water reuse Issues, Technologies and Applications McGraw-Hill 2007.

Recommended Reference Book

1. N. L. Nemerow, Industrial Waste Treatment: Contemporary Practice and Vision for the Future, Butterworth-Heinemann, 2006.