

INDUSTRIAL WASTEWATER TREATMENT

VISemester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE526	Elective	L	T	P	C	CIA	SEE	Total
		3		-	3	30	70	100
Contact Classes: 45		Tutorial Classes: Nil		Practical Classes: Nil			Total Classes: 45	
<p>COURSE OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> I. Enrich the knowledge on sources and characteristics of industrial wastewater. II. Discuss the different methods of waste water treatment such as de-nitrification, membrane separation, air stripping, etc. III. Understand the characteristics and composition of wastewater generated from industrial processes. IV. Design and operate effluent treatment plants for joint treatment of raw industrial wastewater and domestic sewerage. <p>COURSE OUTCOMES (COs):</p> <p>CO 1: Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation..</p> <p>CO 2: Understand the industrial process, water utilization and waste water generation.</p> <p>CO 3: Acquire the knowledge on operational problems of common effluent treatment plants.</p> <p>CO 4: Impart knowledge on selection of treatment methods for industrial wastewater.</p> <p>CO 5: Specify design criteria for physical, chemical, and biological unit operations.</p> <p>COURSE LEARNING OUTCOMES (CLOs):</p> <ol style="list-style-type: none"> 1. Know the different sources of wastewater pollution from industries. 2. Understand the Physical, chemical, organic and biological properties of industrial wastes. 3. Define the Characteristics and composition of waste water. 4. Effects of industrial effluents on sewers and natural water bodies. 5. Understand the different stages of pre and primary treatment of Industrial wastewater. 6. Describe the process of Equalization and Proportioning. 7. Explain the Neutralization process. 8. Understand oil separation by floatation process. 9. Describe the waste Reduction, volume reduction processes. 10. Understand the strength Reduction and the process involved in it. 11. Explain the importance of waste Treatment methods. 12. Understand the process involved in Nitrification and De-nitrification stages of waste water treatment. 13. Understand the process involved in phosphorous removal and Heavy Metal removal. 14. Understand the process involved in Air stripping and Absorption techniques in treatment method. 15. Understand the process involved in Membrane Separation Process. 16. Analyse the special Treatment Methods. 17. Understand the procedure and process of disposing treated waste water. 								

<p>18. Analyse and understand the characteristics and Composition of waste water.</p> <p>19. Manufacturing processes of industries like sugar, steel, petroleum refineries.</p> <p>20. Understand the Characteristics of Industries like Petroleum Refineries.</p> <p>21. Characteristics and composition of industries like textiles, tanneries, atomic energy plants and other mineral processing industries.</p> <p>22. Joint treatment of raw industrial waste water and domestic sewage.</p> <p>23. Common effluent treatment plants location, design, and operation and maintenance problems.</p>		
UNIT-I	CHARACTERISTICS OF INDUSTRIAL WASTE WATER	Classes: 09
Sources of pollution, physical, chemical, organic and biological properties of industrial wastes, difference between industrial and municipal waste waters, effects of industrial effluents on sewers and natural water bodies		
UNIT-II	COMMON TYPES OF TREATMENT PROCESS	Classes: 09
Pre and primary treatment, equalization, proportioning, neutralization, oil separation by floatation, waste reduction, volume reduction, strength reduction.		
UNIT-III	DESCRIPTION OF MAIN TREATMENT METHODS	Classes: 09
Waste treatment methods, nitrification and denitrification, phosphorous removal, heavy metal removal, Membrane separation process, air stripping and absorption processes, special treatment methods, disposal of treated waste water		
UNIT-IV	WASTE WATER FROM DIFFERENT INDUSTRIES	Classes: 09
Characteristics and composition of waste water and manufacturing processes of industries like sugar, characteristics of industries like food processing industries, steel, petroleum refineries		
UNIT-V	COMPOSTION OF WASTE WATER AND COMMON EFFLUENT TREATMENT PLANTS	Classes: 09
Characteristics and composition of industries like textiles, tanneries, atomic energy plants and other mineral processing industries, joint treatment of raw industrial waste water and domestic sewage, common effluent treatment plants location, design, operation and maintenance problems.		
Text Books:		
<ol style="list-style-type: none"> 1. Metcalf and Eddy, "Wastewater engineering Treatment disposal reuse", Tata McGraw-Hill, 4th Edition, 2002. 2. Eckenfelder, W.W., "Industrial Water Pollution Control", McGraw-Hills, 3rd Edition, 1999. 		
Reference Books:		
<ol style="list-style-type: none"> 1. M.N. Rao and Dutta, "Waste Water treatment", Oxford and IBH publishing, 2009. 2. Mark J. Hammer, Mark J. Hammer, Jr., "Water & Wastewater Technology", Prentice Hall of India, 2013. 3. N.L. Nemerrow, "Theories and practices of Industrial Waste Engineering", B H Elsevier, 2007. 4. C.G. Gurnham, "Principles of Industrial Waste Engineering", Wiley, 1955. 		
Web References:		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/105102088/ 		