GUJARAT TECHNOLOGICAL UNIVERSITY

Environmental Engineering (17)

INDUSTRIAL WATER & WASTEWATER TREATMENT
SUBJECT CODE: 2721702
M.E. 2nd SEMESTER

Type of course: Environmental Engineering and Technology

Prerequisite: Basic Knowledge of water and wastewater parameters &
Basic concepts regarding water and wastewater treatment units

Rationale: To provide knowledge related to requirement of industrial water and wastewater treatment technologies and its design

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T/P	P	C	Theory Marks		Tutorial/ Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2	0	4	70	30	30	0	10	10	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Learning Objectives:

- To impart knowledge on the concept and application of industrial pollution prevention, cleaner technologies, industrial wastewater treatment and residue management

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Industrial Water Treatment:** Treatment of water for cooling, heating, steam generation and other process water	4	10
2	**Waste Reduction:** Methods of volume reduction, Strength reduction, Neutralization, Equalization and proportioning as related to Industrial waste treatment.	6	15
3	**Standards for disposal into different Sinks:** Difference between criteria & standards, Stream standards, effluent standards, relevant Indian standards for disposal in to different sinks, costs of pollution control	4	10
4	**Sludge Treatment :** Treatment and disposal of sludge solids	6	15
5	**Saline Water Conversion:** Distillation**,** Electro dialysis, Freezing, Reverse Osmosis.	6	15
6	**Economic Aspects of Industrial Waste Treatment** Concept of joint treatment of industrial and domestic waste, CETP and its design considerations	6	15
7	**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	10	20

Reference Books:

1. Industrial Water Pollution by Nelson L. Nemerow - Addison Wesley Pub. Co.
2. Treatment of Industrial Waste by E.B. Besselievre and M. Schwartz - McGraw Hill, Kega Kusha Ltd. Publication (latest), International Student Edition
3. Wastewater Treatment Plants Planning Designing & Operation by S.R. Quasim - H.R.W. (Holf Rine Heart & Winstone)
4. Industrial water Quality W. W. Eckenfelder, Jr. Davis L. FFord, Andrew Englande McGraw Hill Publishing Co.(2009 ed)
5. Water Quality and Treatment Hand Book of Public Water Supplies by AWWA - McGraw Hill
6. Industrial Waste Treatment by Gurnham
7. Wastewater Engineering: Treatment and Reuse by George Tchobanoglous Publisher Tata McGraw Hill

Course Outcome: After successful completion of the course the students shall be able to

- Recognize, define and understand the quality parameters typically used to characterize industrial wastewater
- Describe various types of process units used for various types of industries (i.e. Textiles, Dairy, Pulp & Paper industry, chemical, Pharmaceutical industries etc.) water and wastewater treatment
- Understand various methods of waste Reduction
- Design operate and optimize conventional and advanced water and wastewater treatment
- Explain a requirement analysis, system design and detailed design for an industrial water and wastewater treatment system which addresses practical water & wastewater treatment process problems and select appropriate processes for target pollutants including emerging pollutants

List of Experiments:

1. Collection of data on Industries located in around the location of institute
2. Preparation of charts of major Industrial water needs and waste water generation streams
3. Collection field data of one industry in detail related to its water requirement and waste water generation and treatment facility with the industry.
4. Treatability study of an industrial effluent
5. Performance evaluation of the existing facilities of typical well established waste water treatment industrial plant
6. Project Preparation of Industrial area or on Specific most polluting Industry
7. Field visit of common effluent treatment plant and its positive points and limitations

Design based Problems (DP)/Open Ended Problem: --

Feasibility studies and designing industrial waste water treatment plant which meets with the requirement of GPCB

List of Open Source Software/learning website:

- http://elearning.vtu.ac.in/
- www.nptel.iitm.ac.in/courses/