SARVAJANIK UNIVERSITY

Sarvajanik College of Engineering and Technology

Master of Technology

Environmental Engineering

M.Tech I: Semester – II

Subject Name: Industrial Waste Management **Subject Code:** MTEN13201

Type of course: Core III

Prerequisite: Basic knowledge of water and wastewater parameters and basic concepts regarding water and wastewater treatment units

Rationale: The course help students to develop better understanding of sources of origin and characteristics of wastewaters from different industries and methods of their proper sampling ,treatment and disposal to keep the environment and community healthy and pollution free

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	30	10	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage %
1	**Introduction :** Types of industries and industrial pollution, Characteristics of industrial wastes, Population equivalent, Bioassay studies, effects of industrial effluents on streams, sewer and land, sewage treatment plants and human health, Environmental legislations and disposal standards related to prevention and control of industrial effluents and hazardous wastes, Sources and quality of water required for different uses in different industries, Treatment of water for cooling, Heating, steam generation and other process water requirement.	8	20
2	**Origin Characteristics and Treatment of Industrial Wastewaters:** 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 Manufacturing Industry	10	20
3	**Cleaner Production and Hazardous waste management:** Waste management approach, Waste audit , Volume and strength reduction , Material and process modifications, Recycle, reuse and byproduct recovery, Applications, Hazardous wastes ,Physico	6	15

	chemical treatment, solidification, incineration, Secured land fills		
4	**Industrial Waste water Reduction and Reuse:** Methods of volume reduction, Strength reduction, Neutralization, Equalization and proportioning as related to Industrial waste treatment, Reuse of industrial wastewaters, 4R's	6	15
5	**Effluent treatment and Sludge Management:** Individual and Common Effluent treatment of industrial and domestic wastewater, Zero effluent discharge systems, Industrial Wastewater reuse Present status and issues, Disposal on water and land, Residuals of industrial wastewater treatment, Quantification and characteristics of Sludge , treatment and disposal of sludge	12	30

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10%	**25%**	**25%**	**20%**	**10%**	**10%**

Legends: R: Remembrance, U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Industrial wastewater treatment, recycling and reuse	Vivek V. Ranade, Vinay M Bhandari	Elsevier Science ISBN: 9780444634030, 0444634037	July 2014	First
2.	Industrial Water Treatment Process Technology	Parimal Pal	Elsevier Science ISBN: 9780128103920, 0128103922	March 2017	-
3.	Industrial liquid effluents	Michael Cox, Pascal Négré, Lourdes Yurramendi	Michelenaartesgráficas - Astigarraga (Gipuzkoa) ISBN: 84-95520-14-1	2007	-
4.	Industrial Waste Water Treatment	A. Patwardhan	PHI Learning ISBN No: 9788120333505	2013	Fifth reprint
5.	Industrial Waste Treatment Technology	Dr Ahmed Asfaq	Katsons	2015	2015
6.	Industrial Wastewater treatment	WunJern Ng	World Scientific Publishing Company ISBN: 9781911298373, 1911298372	June 2006	-
7.	Physico Chemical examination of water, sewage and	N. Manivasakam	PragatiPrakashan, ISBN: 81-7556-834-6	2005	fifth

	Industrial effluents				

Course Outcome:

Sr. No.	CO Statement	Marks % weightage
CO-1	Understand the industrial process, water utilization, origin waste water generation and characteristics *(R,U – Cognitive level)*	25
CO-2	Understand the environmental legislations and disposal standards related to prevention and control of industrial effluents and hazardous wastes *(R,U, A– Cognitive level)*	15
CO-3	Understand various methods of cleaner productions ,waste Reduction and waste management *(A,N,E – Cognitive level)*	20
CO-4	Impart knowledge on selection of treatment methods for industrial wastewater *(N,E – Cognitive level)*	25
CO-5	Impart knowledge on zero discharge and sludge management *(N,E,C – Cognitive level)*	15

List Of Practicals:

1. Collection of detailed data on different industries located in/around the city.
2. Characterisation of wastewater from industry (any two)
3. Treatability study of the industrial effluent characterized
4. Field visit of common effluent treatment plant and industry
5. Report preparation of Industrial area or on specific most polluting industry
6. Preparation of Graduate Report

Major Equipment:

1. COD Analyser
2. Dissolved Oxygen Meter
3. BOD Incubator/Analyser
4. Turbidity Meter
5. Conductivity Meter
6. pH Meter
7. Jar Test Apparatus
8. Titration Apparatus
9. Hot Air Oven
10. Microscope
11. Spectrophotometer

List of Open Source/learning website:

Sources of industrial wastewater
https://www.youtube.com/watch?v=in3GSRuooRs&t=75s
Industrial Wastewater reduction
https://www.youtube.com/watch?v=in3GSRuooRs&t=385s
Module 5: Recycle of wastewater
https://nptel.ac.in/courses/105/105/105105178/