

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**CHEMICAL ENGINEERING (30)**  
**Elective II**  
**INDUSTRIAL POLLUTION CONTROL**  
**SUBJECT CODE:3713017**  
**M.E. Semester-I**

**Type of course: Program Specific Elective - II**

**Prerequisite:** None

**Rationale:**

The Course focuses on principles of various types of industrial pollution control and its abatement. It explain the students with different treatment technologies and thereby management of various wastes in industries.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

**Content:**

Sr. No.	Content	Hrs	% Weightage
1	<b>Industries &amp; Environment</b> Industrial scenario in India - Industrial activity and Environment - Uses of Water by industry -Sources and types of industrial wastewater - Industrial wastewater and environmental impacts - Regulatory requirements for treatment of industrial wastewater - Industrial waste survey – Industrial wastewater generation rates, characterization and variables - Population equivalent - Toxicity of industrial effluents and Bioassay tests.	11	21
2	<b>Industrial Noise pollution</b> Sources of noise pollution, characterization of noise pollution prevention& control of noise pollution, Factories Act 1948 for regulatory aspects of noise pollution.	7	12
3	<b>Air Pollutant Abatement</b> Air pollutants scales of concentration, lapse rate and stability, plume behavior, dispersion of air pollutants, atmospheric dispersion equation and its solutions, Gaussian plume models. Air pollution control methods, Source correction methods, Design concepts for pollution abatement systems for particulates and gases. Such as gravity chambers, cyclone separators, filters, electrostatic precipitators, condensation, adsorption and absorption, thermal oxidation and biological processes.	12	22
4	<b>Waste water treatment processes</b> Design concepts for primary treatment, grid chambers and primary sedimentation basins, selection of treatment process flow diagram, elements of conceptual process design, design of thickener, biological treatment Bacterial population dynamics, kinetics of biological growth and its applications to biological treatment, process design relationships and	12	23

	analysis, determination of kinetic coefficients, activated sludge process. Design, trickling filter design considerations, advanced treatment processes, Study of environment pollution from process industries and their abatement: Fertilizer, paper and pulp, inorganic acids, petroleum and petrochemicals, recovery of materials from process effluents.		
<b>5</b>	<b>Solid waste and Hazardous waste management</b> Sources and classification, properties, public health aspects, Sanitary land fill design, Hazardous waste classification and rules, management strategies, Nuclear waste disposal Treatment methods – component separation, chemical and biological treatment, incineration, solidification and stabilization, and disposal methods, Latest Trends in solid waste management.	12	22

### Reference Books:

1. Rao C.S., “Environmental Pollution Control Engineering”, 2nd edition
2. Mahajan S.P., “Pollution Control in Process Industries”.
3. Nemerow N.L., “Liquid waste of industry- theories, Practices and Treatment”, Addison Wesley, New York, 1971
4. Weber W.J., “Physico-Chemical Processes for water quality control”, Wiley Interscience New York, 1969
5. Strauss W., “Industrial Gas Cleaning”, Pergamon, London, 1975
6. Stern A.C., “Air pollution”, Volumes I to VI, academic Press, New York, 1968
7. Peterson and Gross .E Jr., “Hand Book of Noise Measurement”, 7th Edn, 2003.
8. Antony Milne, “Noise Pollution: Impact and Counter Measures”, David & Charles PLC, 2009.

### Course Outcome:

At the end of the course, the student will be able to:

1. Recognize the causes and effects of environmental pollution
2. Analyze the mechanism of proliferation of pollution
3. Develop methods for pollution abatement and waste minimization
4. Design treatment methods for gas, liquid and solid wastes

### List of Open Source Software/learning website:

- Softwares: Pollution Control Systems & Air Pollution Simulation - ANSYS, Anti-pollution software - Down To Earth
- Students can refer to video lectures available on the websites including NPTEL.
- Students can refer to the CDs which are available with some reference books for the solution of problems using softwares. Students can develop their own programs for the solutions of problems.