

Course code	Course Name	L-T-P-Credits	Year of Introduction
IC363	ENVIRONMENTAL INSTRUMENTATION AND SAFETY	3-0-0-3	2016

**Prerequisite: Nil**

**Course Objectives**

1. To get basic idea about the classification of pollution and their characteristics
2. To familiarize with different application oriented topics like pollution control in petroleum, paper and cement industries
3. To understand the design of systems for water and air pollution control
4. To study the safety aspects of Environmental Engineering and proper waste disposal methods

**Syllabus**

Introduction to Environmental Engineering and Safety, Classification and sources of Environmental Pollution, Air and Water Pollution, Pollution control in industries, Pollution case studies, Waste water treatment, Air monitoring and noise control.

**Expected outcome**

The student will be

- i. able to apply the knowledge of Environmental Engineering & Control strategies
- ii. equipped to take up pollution control related topics as part of their project works.

**Text Books:**

- 1) M. N. Rao & H. V. N. Rao, Air Pollution Engineering.
- 2) Randy D. Down, Environmental Instrumentation & Analysis Handbook.

**References:**

- 1) H. S Peavey et al., Environmental Engineering, McGraw Hill.
- 2) Kaurav, Rao.M.N and H.V.N. Rao, Air pollution, Tata McGraw Hill.
- 3) Mahajan.S.P, Pollution control in process industries, Tata-McGraw Hill.
- 4) Metcalf and Eddy, Waste water engineering, treatment, disposal, reuse, Tata-McGraw Hill.
- 5) Rao.C.S, Environmental pollution control engineering, New age international (P) ltd.
- 6) V.P. Kuderia, Noise Pollution & Its Control, Pragati Prakasan, 2000, ISBN-81-7556-186-6
- 7) Walter J. Weber, Water Treatment Technology.
- 8) Wark & Warner, Air Pollution Control Technology.

<b>COURSE PLAN</b>			
<b>Module</b>	<b>Contents</b>	<b>Hours</b>	<b>Semester Exam Marks</b>
<b>I</b>	An overview of environmental laws and regulations, toxicology.	1	15%
	Classification of pollution: Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards and hazardous waste, occupational safety and health.	2	
	Necessity of instrumentation & control for environment - sensor requirement for environment.	1	
	Instrumentation methodologies: Ultraviolet analyzers, total hydrocarbon analyzers using flame ionization detector, Gas chromatography in environmental analysis, photo ionization, portable & stationary analytical instruments.	3	
<b>II</b>	<i>Quality of water: Standards of raw &amp; treated water - effects of water quality.</i>	2	15%
	Water quality parameters: Thermal conductivity, pH, dissolved oxygen, anions, turbidity.		
	Water quality Detectors, Opacity monitors, pH analyzers & their application, conductivity analyzers & their application. Spectrometric methods- emission spectrograph- atomic absorption spectra photometry.	4	
<b>FIRST INTERNAL EXAM</b>			
<b>III</b>	Air pollution: definitions, importance of air pollution, Air Pollutants - Basics of monitoring technologies like conductimetry, coulometry.	3	15%
	Piezoelectric oscillations methods-paper tape method- optical method-air pollution monitoring instruments.	2	
	Air sampling methods & equipments.	1	
<b>IV</b>	Pollution control in industries: pollution control in petroleum refineries, fertilizer industries, pulp and paper industries, cement industries.	7	15%
	<i>Pollution case studies - disaster management: floods, earth quake, cyclone and landslides, Environmental disaster monitoring.</i>		
	<i>Handling and management of hospital wastes.</i>		
<b>SECOND INTERNAL EXAM</b>			
<b>V</b>	Waste water treatment: unit operations of pre treatment and primary treatment, Concept of common effluent treatment plant (CETP).Zero discharge systems.	3	20%

	Automatic waste water sampling, optimum waste water sampling locations and waste water measurement techniques.	2	
	Instrumentation set up for waste water treatment plant. Requirement of water treatment facilities, process design.	3	
VI	Air monitoring: measurement of ambient air quality.	1	20%
	Air pollution control of stationary sources: gaseous pollutants and particulate pollutants.	2	
	Air pollution control of mobile sources: automobile emissions. Control of air pollution.	2	
	Noise pollution: effect of noise pollution on people and community, noise area classification and hearing conservation.	1	
	Noise sources and criteria, noise level measurement, noise absorption techniques and noise control.	2	
<b>END SEMESTER EXAM</b>			

**QUESTION PAPER PATTERN:**

Maximum Marks: 100

Exam Duration: 3 Hours

**Part A**

Answer any two out of three questions uniformly covering Modules 1 and 2. Each question carries 15 marks and can have not more than four sub divisions. (15 x 2 = 30 marks)

**Part B**

Answer any two out of three questions uniformly covering Modules 3 and 4. Each question carries 15 marks and can have not more than four sub divisions. (15 x 2 = 30 marks)

**Part C**

Answer any two out of three questions uniformly covering Modules 5 and 6. Each question carries 20 marks and can have not more than four sub divisions. (20 x 2 = 40 marks)