SEMESTER S8
ENVIRONMENTAL INSTRUMENTATION

Course Code	**OEICT832**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. The aim of environmental instrumentation program is to offer students a basic knowledge of Environmental Instrumentation.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to Environmental Engineering** An overview of environmental laws and regulations. Necessity of Instrumentation & Control for environment, sensor requirement for environment, Classification of pollution: Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards and hazardous waste, occupational safety and health. Causes, Effects and control of all types of Pollution.	9
2	**Quality of water** Standards of raw & treated water, sources of water & their natural quality, effects of water quality. Water quality parameters: Thermal conductivity, dissolved oxygen, anions, turbidity. Water Quality detectors, Opacity monitors, conductivity analysers & their application. Spectrometric methods- emission spectrograph- atomic absorption spectra.	9
3	**Air monitoring** Measurement of ambient air quality. Air pollution control of stationary sources: gaseous pollutants and particulate pollutants. Air pollution control of mobile sources: automobile emissions. Noise pollution: effect of noise pollution on people and community, noise area classification and hearing conservation. Noise sources and criteria, noise level measurement, noise absorption techniques and noise control.	9

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4	**Pollution control in industries** pollution control in petroleum refineries, fertilizer industries, pulp and paper industries, cement industries. Pollution case studies - disaster management: floods, earthquake, cyclone and landslides, Environmental disaster monitoring. Handling and management of hospital wastes.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination-2 (Written)	Total
5	**15**	**10**	**10**	**40**

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Discuss the role of Instrumentation in Environmental aspects.	**K2**
CO2	Explain the design of systems for water and air pollution control.	**K2**
CO3	Discuss the safety aspects of Environmental Engineering and proper waste disposal method	**K2**
CO4	Discuss the applications like pollution control in petroleum, paper and cement industries.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2						3					2
CO2	2						3					2
CO3	2						3					2
CO4	2						3					2
CO5												

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

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Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Environmental Instrumentation & Analysis Handbook	Randy D. Down	WileyInterscience	1/e
2	Air Pollution Engineering	M. N. Rao & H. V. N. Rao	McGraw Hill Education	1/e

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Principles of Instrumental Analysis	Skoog, Holler, Nieman	Cengage Learning	7/e
2	Introduction to Instrumental Analysis	Braun, Robert D., Pharma	Pharma MEd Press/BSP Books	2019
3	Analytical Instrumentation	Sherman R.E. and Rhodes L.J		ISA.

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	http://acl.digimat.in/nptel/courses/video/103107215/L09.html
2	https://www.digimat.in/nptel/courses/video/105107207/L32.html
3	https://www.youtube.com/watch?v=lTZPRJtLdeg
4	http://digimat.in/nptel/courses/video/103107215/L49.html

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