GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3173521
Semester – VII
Subject Name: Environmental Monitoring and Statistics

Type of course: Professional Elective Course

Prerequisite: Knowledge of subjects Environmental Sciences.

Rationale: Analysis of water, wastewater and air samples is the first step towards designing treatment technologies for water, waste water and air pollution control. Much information can be obtained by statistical analysis of the data on environmental parameters. This subject aims at equipping the student with methods of monitoring and managing the data generated.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	1	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1.	**Environmental Monitoring:** Purpose of monitoring, Scales of observation, Environmental characteristics, Representative units, Sampling Location, Types of environmental monitoring, Sampling plan, Analytical data quality requirements: Precision and Accuracy, Detection limits, Reporting data.	10
2.	**Water Quality Monitoring** Sampling techniques, Preservation of water sample, Physical Properties of water & its monitoring: Temperature, Conductivity, Turbidity etc., Chemical Properties of water & its monitoring 1. Electrometric method: pH 2.Colorimetric method 3.Spectroscopy method, Standardization & calibration of monitoring instruments. **Air Quality Monitoring** Type of Air Quality monitoring - Ambient Air Quality monitoring, Source Air Quality monitoring, Ambient Air Quality Monitoring- Selection of monitoring sites , Sampling time, Frequency & mode of sampling, Source Air Quality Monitoring – Type of	08

	Monitoring procedure	
3.	**Physical, Chemical and Microbial contaminants** Physical contaminants – Naturally occurring particulates, Human made particulates, Mechanisms and control of particulate, Chemical contaminant:- Type of contaminants, Sources of Contaminants, contaminant transport and fate, Microbial contaminants:- Environmentally transmitted pathogens, concept of indicator organisms, sample processing and storage **Surface Water and Ground Water Monitoring** Surface Water Monitoring:-Water Quality parameters, sampling the waters, Water sampling equipments, Ground Water Monitoring: - Objectives, Location of monitor wells, well construction, Design and Execution of ground water sampling programs	10
4.	**Statistics in Environmental Monitoring** Samples & Population : Random Sampling, Sample support, Frequency Distribution & Probability Density Function : Mean , Variance , Standard Deviation , Gaussian Variable, Sample size & Confidence interval, Co variance & Correlation, Liner Regression, Interpolation & Spatial Distribution.	08

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**15**	**20**	**15**	**10**	**0**

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

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1) Environmental monitoring and characterization by Janick F Artiola, Ian L Pepper, Mark Brusseau
2) Environmental Chemistry by Sawyer & McCarty

Course Outcome:
After learning the course the students will be able to:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Identify sampling locations for Environmental monitoring	25
CO-2	Classify the methods of Air quality and Water quality Monitoring	20
CO-3	Assess Micro biological analysis	20

CO-4	Differentiate the methods of estimation of physical, chemical and biological contaminates	20
CO-5	Explain methods used for calculations of statistics in environmental monitoring	15

List of Tutorial:

Term work will comprise of assignments on the questions related to

1. Sampling locations: Air and water
2. Numerical on statistics in environmental monitoring,
3. Water quality monitoring,
4. Air quality monitoring,
5. Physical, chemical and microbial contaminants,
6. Surface water monitoring and

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