GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3151310
SUBJECT NAME: Environmental Monitoring and statistical Methods
Semester 5

Type of course: Analytical

Prerequisite: Knowledge of subjects Environmental Sciences I and II and Fundamentals of Air Pollution.

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

Content:

Sr. No.	Content	Total Hrs	% Weightage
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	**08**	14
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.	**10**	18
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	**10**	18

4	**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**	18
5	**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 Monitoring procedure.	**10**	18
6	**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**	14

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
10	**25**	**30**	**25**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate 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:

Sr. No.	CO statement	Marks % weightage
CO-1	Prepare Environmental Monitoring Plan and identify sampling locations	10
CO-2	Carry out Surface and Ground Water quality monitoring	40
CO-3	Carry out Air Quality Sampling	30
CO-4	Carry out statistical analysis of Environmental Monitoring data and	20

List of Experiments:

(1) Prepare Environmental monitoring plan for surface water sampling.
(2) Collection of surface water samples and carryout Water quality monitoring
(3) Collection of ground water samples and its analysis
(4) Identification of Sampling locations for Air quality monitoring.
(5) To carry out Air quality monitoring,
(6) Numericals on statistics in environmental monitoring,