GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Environmental Engineering (13), Environmental Science & Engineering (37)
SUBJECT NAME: Environmental Monitoring and Statistics
SUBJECT CODE: 2171305
B.E. 7TH SEMESTER

Type of course: Analytical

Prerequisite: Knowledge of subjects Environmental Sciences I and II.

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)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	2	0	6	70	30	0	30	0	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

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	**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
4	**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
5	**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
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
20	**25**	**30**	**15**	**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:

After learning the course the students should be able to:

1. Identify sampling locations for Environmental monitoring.
2. Carry out Air quality and Water quality Monitoring.
3. Carry out Micro biological analysis .

List of Experiments:

Term work will comprise of assignments on the questions related to

(1) Environmental monitoring
(2) Sampling locations :Air and water
(3) Numericals on statistics in environmental monitoring,
(4) Water quality monitoring,
(5) Air quality monitoring,
(6) Physical, chemical and microbial contaminants,
(7) Surface water monitoring and
(8) Ground water monitoring.

Design based Problems (DP)/Open Ended Problem:

Major Equipment:

List of Open Source Software/learning website: