GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3173524

Semester – VII
Subject Name: Advanced Instrumentation Techniques

Type of course: Open Elective

Prerequisite: Fundamental of instrumentation

Rationale: The main objective of this subject is to make students aware about the importance of instrumentation in Environmental Science and Technology

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	0	0	3	70	30	0	0	100

Sr. No.	Course Content	Weightage
1.	Scope of Instrumentation in Environmental Science and Technology, Instrumentation for Field Observations: Remote Sensing Related Equipment's, Principles of Quadrat Survey, pH and Electrical Conductivity in Soil and Water Samples, Introduction to Laboratory Techniques and Instrumentation	12
2.	Infrared Absorption Spectroscopy, Instrumentation for Air Sampling and Analyses, Integrated or Long Term Air Sampling, Ultraviolet analyzer, Total hydrocarbon analyzer using flame ionization detector, Flame Emission Spectroscopy, Gas chromatography n environmental analysis	12
3.	Photoionization, Portable versus stationery analytical instrument, Gas survey instruments, Ion chromatography for the analysis of inorganic anions in water, ultra violet analysis of water and wastewater, Thermal conductivity detector, pH analyzer and their application, Instrumentation for Noise and Sound Measurements, Quality Control Assurance in Sampling, Electronic Direct Reading Instrumentation	12

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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**20**	**10**	**10**	**5**	**5**

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. Standard methods for the examination of water and wastewater; published by American public Health Association, American water works Association, Water pollution control federation (21st Edition & later).
2. Chemistry for Environmental Engineering by Sawyer and M C Carty (4th Edition-McGraw-Hill Publishing Company Ltd.)
3. Environmental Instrumentation and Analysis Handbook. Editor(s):Randy D. Down P.E, Jay H. Lehr
4. Environmental Science and Engineering Volume 7 Instrumentation, Modelling & Analysis. Author: Bhola R Gurjar.

Note: Apart from above references one can use some other books and material if required.

Course Outcome:

After learning this course students will be able to

Sr. No.	CO statement	Weightage
CO-1	Evaluate fundaments of Analytical Techniques	20
CO-2	Understand working of instruments as well as development of new technologies	15
CO-3	Assess assurance of quality and safety	15
CO-4	Differentiate various instrumentation used for environment analysis	15
CO-5	Explain various instrumentation process used for environment analysis	20
CO-6	Evaluate assurance of instruments	15