



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3131305

Semester – III

Subject Name: Environmental Chemistry-I

Type of course: Basic Sciences

Prerequisite: None

Rationale: Quantitative and qualitative analysis of environmental parameters is a very important aspect of studies of Environmental Engg. The subject of Env chemistry I deals with qualitative and quantitative analysis of water and accurate determination of parameters

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Familiarization with lab ware and instruments: Glass ware, Plastic ware and measuring instruments, calibration of lab ware and instruments, cleaning solutions; cleaning and washing procedures for chemical and microbiological analysis	04
2	Distilled and dematerialized waters: Methods of preparing distilled waters, Methods of preparing dematerialized water: Reverse osmosis, ion-exchange and electro dialysis, Methods of preparing high purity waters	04
3	General Chemical concepts: Molar, Molal, Normal solutions, Valency, oxidation state and Bonding, Chemical Equations and weight Relationship, gas laws and its applications; units of expression of results and their interrelationships, precision and accuracy.	08
4	Preparation of standard solutions: Relationship of atomic, molecular, formula and equivalent weights and solutions, Requirements of primary standards, Secondary Standards and their standardization,	08

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	characteristics of common laboratory chemicals	
5	Volumetric and Gravimetric Analysis: Sampling methods , Concept and applications of Quantitative analysis: Precipitation, filtration, Drying, Desiccation, Concept and applications of Volumetric analysis in engineering field	08
6	Standard methods for analysis of water and wastewater	02
7	Instrumental Analysis: Concept of Optical Methods of Analysis, Emission Methods, Dispersion and scattering methods, Electrical methods	06
8	Analysis of water quality parameters:: Sources, environmental significance, method of sample collection, application of data, methods of measurements as per standard methods for pH, Solids, Hardness, Alkalinity, Chlorides, Sulfates	16

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	25	15	20	0	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. Chemistry for Environmental Engineering by Clair N. Sawyer and Perry L. McCarty
2. Quantitative Analysis by R.A. Day, Jr. and A.L. Underwood
3. Standard Methods for Water and Wastewater Analysis by AWWA



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Course Outcomes:

Sr. No.	CO statement	Marks % Weightage
CO-1	Understand the use of glassware & instruments for analysis & calibration.	10
CO-2	Prepare standard solutions & high purity waters using general chemistry concepts.	30
CO-3	Explain methods for water sample collection & analysis.	30
CO-4	Perform various water quality parameters.	30

List of Experiments:

1. Familiarization with labware in instruments used in environmental engineering laboratory
2. Calibration of different glass wares & Instruments (pH meter and Weigh balance)
3. Preparation of primary and secondary standards solutions and its standardization
4. To determine pH of given water and wastewater samples.
5. To Determine Total solids (TS), Total suspended solids (TSS) and Total dissolved solids (TDS) for given water and wastewater samples.
6. To determine Total Hardness , Calcium Hardness and magnesium hardness from given water samples
7. To determine Alkalinity (Phenolphthaleine and Methyl orange Alkalinity) from given water samples.
8. To determine Chloride from given water and wastewater samples.
9. To determine sulphates of given water and wastewater samples.
10. Numericals on pH.
11. Numericals on Solids
12. Numericals on Hardness
13. Numericals on Alkalinity

Major Equipment:

pH meter, Hot air oven, TDS meter, weight balance

List of Open Source Software/learning website: virtual lab