

GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL ENGINEERING (13)

ENVIRONMENTAL SCIENCES II

SUBJECT CODE: 2141302

B.E. 4TH SEMESTER

Type of course: Applied Sciences

Prerequisite: Knowledge of Environmental Sciences I

Rationale: To make students aware of applications of Chemistry in Environmental Engg

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)		
				PA	ALA	ESE	OEP			
3	0	4	7	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Equilibrium Chemistry Ionization, Complex ions, Solubility product, Common Ion effect Diverse Ion effect, Amphoteric hydroxides.	06	14
2	Physical Chemistry Binary mixtures, solution of solids in liquids, osmosis, dialysis, solvent extraction, catalysis	04	10
3	Organic chemistry : Aliphatic compounds , aromatic compounds, heterocyclic compounds, carbohydrates, fats, proteins, amino acids, Detergents and oil and waxes , pesticides	12	28
4	Colloidal Chemistry: General properties of colloids, colloidal dispersions in liquids and air.	04	10
5	Parameters of wastewater analysis: Basic concepts and determination of acidity, chemical oxygen demand, Dissolved oxygen, Biochemical Oxygen Demand , Nitrogen , sulphates, , grease and oils, volatile acids .	16	38

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
10	15	20	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. Chemistry for Env. Eng. by Sawyer and McCarty
2. Standard methods for analysis of water and waste water-Published by AWWA.
3. Environmental Chemistry by A.K.De

Course Outcome:

After learning the course the students should be able to:

1. Solve the numerical based on the concepts of quantitative chemistry
2. Apply the concepts of Physical chemistry to solve the environmental problems.
3. Apply the concept of organic chemistry and correlate the organic matter with biodegradation.
4. Determination of the concentration of different parameters in water and wastewater samples like Sulphate, DO, COD, BOD etc..

List of Experiments:

1. Determination of acidity of water and wastewater samples.
2. Determination of sulphates from water and wastewater.
3. Determination of DO from water and wastewater samples.
4. Determination of COD from wastewater.
5. Determination of BOD from samples.
6. Determination of oil and grease from wastewater samples.
7. Determination of volatile acids from wastewater.

Design based Problems (DP)/Open Ended Problem:

1. The students will be given actual wastewater samples from industries to analyze for all the parameters.
2. The students will be made to analyze the water samples collected from their homes for basic parameters.

Major Equipment:

COD soxhlet apparatus with reflux tubes

BOD incubator
Balance : Monopan
Magnetic stirrer
DO meter
Hot air oven

Active Learning Assignments (ALA) : Preparation of power-point slides: which may include videos, animations, pictures, graphics for better understanding of theory and practical work. The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus can be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of faculty and the department.