GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3141309
Semester – IV
Subject Name: Fundamentals of Wastewater Quality

Type of course: Basic Science

Prerequisite: Knowledge of Environmental Chemistry I

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

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	4	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Basic concept of Equilibrium Chemistry: Equilibrium and Le Chartelier's principle, activity and activity coefficient, Ionization, Complex ions, Solubility product, Common Ion effect Diverse Ion effect, Amphoteric hydroxides	**06**
2	Physical Chemistry : Binary mixtures, solution of solids in liquids, osmosis, dialysis, solvent extraction, basics of catalysis and adsorption	**04**
3	Basics of Organic chemistry: Aliphatic compounds , aromatic compounds, heterocyclic compounds, carbohydrates, fats, oil and waxes, proteins, amino acids, Detergents and pesticides	**06**
4	Basic concept of Biochemistry; Enzymes, cofactors, temperature relationship, pH, major and trace elements, biodegradation, biochemistry of carbohydrates, proteins and fats and oil, general biochemical pathways.	**02**
5	Colloidal Chemistry: General properties of colloids, colloidal dispersions in liquids and air.	**02**
6	Analysis of wastewater quality parameters:: Sources, environmental significance, method of sample collection, application of data, methods of measurements as per standard methods for acidity, chemical oxygen demand, Dissolved oxygen, Biochemical Oxygen Demand , Nitrogen , phosphorous	**22**

	and phosphate, sulphates, grease and oils, volatile acids	

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
15	**20**	**15**	**20**		

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, Tata McGraw –Hill publication

2. Quantitative Analysis by R.A. Day, Jr. and A.L. Underwood , Pearson publication

3. Standard Methods for Water and Wastewater Analysis, 23rd edition, by America public health association, American Water Works Association, Water Environment Federation

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Solve the numerical based on the concepts of equilibrium chemistry	15
CO-2	Apply the concepts of Physical chemistry and colloidal chemistry to solve the environmental problems.	15
CO-3	Apply the concept of organic chemistry in the Environment and correlate the organic matter with biodegradation.	20

CO-4	Determination of the concentration of different parameters in water and wastewater samples like Sulphate, DO, COD, BOD etc.	50

List of Experiments:

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

Major Equipment:

COD soxhlet appuratus with reflux tubes
BOD incubator
Balance
Magnetic stirrer
Hot air oven
Aerator

List of Open Source Software/learning website:

http://www.vlab.co.in,

https://nptel.ac.in/