GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3171308
Semester – VII
Subject Name: ANAEROBIC BIOLOGICAL TREATMENT TECHNOLOGIES

Type of course: Professional Elective Course

Prerequisite: Knowledge of Biological Treatment Processes

Rationale: Different anaerobic biological treatments are required for treatment of organic waste.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ES (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Contents	Total Hrs
1	Anaerobic Treatment : Fundamental concept, Application • Applications, Advantages & disadvantages of Anaerobic Treatment. • Principles of Anaerobic Treatment, Methanogenic series Metabolism, COD equivalence of Methane. • Factors affecting Anaerobic Treatment • Evaluating the applicability of Anaerobic Treatment	06
2	Microbiology and Biochemistry of Anaerobic Treatment processes. • Sources of Methane in Anaerobic Treatment • Role of Acid fermentation and Methane fermentation • Effects of sulphate reducing bacteria	06
3	Anaerobic Reactors • Anaerobic Suspended growth processes • Anaerobic Attached growth processes • Anaerobic Sludge Blanket processes	08
4	Process operation parameter • Mixing and facilities • Heating facilities	06
5	Design of Anaerobic reactors : Stabilization pond, Oxidation pond, anaerobic lagoons, standard rate and high rate sludge digesters, Upflow Anaerobic Sludge Blanket, Upflow Anaerobic Filters.	16

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks

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R Level	U Level	A Level	N Level	E Level	C Level
10	25	25	25	15	0

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. Anaerobic Biotechnology for Industrial Wastewater by Dr. R.E. Speece ARCHAE PRESS
2. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy
3. Design of Anaerobic Process for the Treatment of Industrial and Municipal Wastes by J. F. Malina
4. Biological Process Design for Wastewater Treatment by Larry D Benefield, Clifford W Randall

Course Outcome:

Sr. No.	CO statements	Marks % Weightage
CO-1	Understand the pathways of anaerobic treatment.	30
CO-2	Classify and compare the various types of Anaerobic Reactors	20
CO-3	Describe the different operating parameters for anaerobic treatment.	10
CO-4	Design the different types of anaerobic bioreactors depending upon the suitability of each for different types of waste.	40

List of Practicals:

1. To measure the methane content of anaerobic reactor.
2. To measure the COD reduction in Biphasic reactor.
3. To measure the VFA to alkalinity ratio.
4. To measure the BMP of given waste.