



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Bachelor of Engineering**

**Subject Code: 3143511**

**Semester – IV**

**Subject Name: WASTEWATER TREATMENT - I**

**Type of course:** Professional Core Course

**Prerequisite:** Fundamental knowledge of water pollution.

**Rationale:** The main objective of this subject is to make students aware about different types of impurities present in wastewater along with the different treatments used to remove these impurities.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	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.	Introduction to wastewater treatment: Wastewater Constituents, Characteristics of wastewater: Physical, chemical, biological. Sources of water & generation of wastewater. Standard wastewater discharge limits as prescribed by competent authority. Drinking water standards.	10
2.	Introduction to Sewage Treatment plant and Effluent Treatment Plant. Sampling & preservation of wastewater samples (Objective, Selection of sample containers, Selection of type of sampling, Selection of sampling points, Selection of type of filling the container, In – situ measurements, Sample labeling, Collection and preservation of samples for organics and trace metals, Sampling and Handling Requirements).	08
3.	Theory and measurement of physical, chemical and biological parameters: pH, Color, Turbidity, TDS, TSS, Alkalinity, Hardness, COD, BOD.	08
4.	Preliminary Treatment of wastewater: Screening: Types & classification of screens, purpose, head loss in screens. Oil & Grease Removal, Dissolved air flotation. Flow Equalization: Types of equalization and equalization tank. Grit chamber: Types, characteristic of grit, generation & disposal.	10



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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:

- Wastewater Engineering: Treatment and Reuse, Metcalf & eddy; McGraw Hill Book Company, 4th Ed, 2002.
- Environmental Pollution and Control engineering, Rao C. S. - Wiley Eastern Limited, India, 1993
- Water Treatment Plants: Planning, Design & Control, S R Qasim, Technomic Pub. Co., 1999.
- Industrial Water Pollution Control, Eckenfelder W.W.; McGraw Hill Book Company, 3rd Ed, 2000.
- Environmental Engineering, Kiely G.; McGraw Hill Book Company, 1998.
- Pollution control in process industries, S.P. Mahajan TMH., 1985.
- Waste water treatment, M.Narayana Rao and A.K.Datta, Oxford and IHB publ. New Delhi.
- Industrial Pollution Control and Engineering, Swamy AVN, Galgotia publications, 2005.
- Environmental Engineering (Vol. II) - Sewage disposal and Air pollution, S.K Garg & Rajeshwari Garg, Khanna Publishers, 27th Edition, 2013.
- Environmental Engineering and Sanitation: Joseph A. Salvato, John Wiley & Sons, 4th Ed. 2003
- Water Supply and Sanitary Engineering, Birdie and Birdie, Dhanpatrai and Sons, 1996.
- Environmental engineering (Vol. I) - Water Supply Engineering S.K Garg & Rajeshwari Garg, Khanna Publishers, 23rd Edition, 2013.

## Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Describe different characteristic of water and wastewater.	20
CO-2	Explain physical unit operations used for treatment of wastewater.	10
CO-3	Interpret the difference between physical and chemical treatment of wastewater.	20
CO-4	Identify the degree of treatment required for a particular stream of wastewater.	15
CO-5	Understand the concept of various wastewater parameters.	20
CO-6	Compare different methods used for the treatment and disposal of sludge.	15