



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3171306

Semester – VII

Subject Name: WASTEWATER ENGINEERING

Type of course: Professional Core Course

Prerequisite: Knowledge of physic chemical and biological treatment of wastewater

Rationale: This course provides fundamentals for selection and design of the most appropriate and sustainable wastewater treatment systems. It also provides the basics on technology selection and engineering economics for analysis, evaluation and comparison of different treatment alternatives.

Teaching and Examination Scheme:

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

Content:

Sr. No.	Content	Total Hrs
1	Domestic, Municipal and Industrial Wastewater • Definition , Characteristics and features • Treatment flow schemes and basic design considerations for domestic wastewater, municipal wastewater and industrial wastewater	02
2	Design of Physical Unit Operations for Wastewater Treatment • Design of coarse screen • Design of conventional grit chamber and aerated grit chamber • Design of equalization tank • Design for oil & grease removal unit • Design of Primary Sedimentation Tank • Operational problems of physical unit operations	08



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4	Design of biological treatment processes for Wastewater Treatment [A] Aerobic process - Detailed design of following suspended growth processes (i) Complete Mix ASP (ii) Sequencing Batch Reactor (iii) Waste stabilization ponds - Operational problems of suspended growth processes Detailed design of following attached growth processes (i) Bio Towers (ii) Rotating Biological Contactors - Operational problems - Types and design of aeration system - Design of secondary Settling tank [B] Anaerobic processes - Design of UASB - Design of Septic Tank - Operational problems	24
5.	Design of Sludge handling Units: - Design of Sludge Drying Beds - Design of Filter Press - Design of Sludge Digesters	08

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	10	20	20

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. Wastewater Engineering, Treatment & Reuse by Metcalf & edition Tata – Mcraw –Hill edition



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2. Water Works Engineering Planning, Design & operation by Syed R Qasim, Edward M Motley & Guang Zhu Published by Prentice Hall of India.
3. Environmental Engineering – A design approach by Arcadio P. Sincero & Grecjoria A. Sincero (Prentice Hall of India).
4. Wastewater treatment concept and design approach by G.L.Karia and R.A. Christian, PHI learning Pvt.Ltd.
- 5.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Compare the Domestic, Municipal and Industrial Wastewater.	5
CO-2	Design of Physico-chemical treatment Units.	20
CO-3	Design of the biological wastewater treatment units.	55
CO-4	Estimate the sludge generation in wastewater treatment and formulate the sludge handling units.	20

List of practical/detailed drawing of design units:

1. Design and Detailed drawing of coarse screen
2. Design and Detailed drawing of Grit chamber.
3. Design and Detailed drawing of primary sedimentation tank
4. Design and Detailed drawing of Aeration and secondary settling tank
5. Design and Detailed drawing of bio tower.
6. Design and Detailed drawing of RBC.
7. Design and Detailed drawing of Sludge Digester.