



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: Post Graduate

Subject Code: ME03018011

Subject Name: Wastewater Treatment Units Design

w.e.f. Academic Year:	2024-25
Semester:	3
Category of the Course:	MOPEC

Prerequisite:	Knowledge of Basic concepts and equations regarding wastewater treatment.
Rationale:	This course provides fundamentals for selection and design of the most appropriate wastewater pollution control units.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes
1	Develop skills to size and design the Preliminary and Primary Treatment Units.
2	Design and optimize the Biological Treatment units.
3	Develop solutions to design Sludge Treatment units.
4	Apply engineering principles to design advanced treatment units.

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial/Practical	
			ESE (E)		PA/ CA (M)	PA/CA(I)	ESE (V)	
3	0	0	3	70	30	0	0	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
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1	Preliminary and Primary Treatment Units for Wastewater <ul style="list-style-type: none">• Design of Screens• Design of Grit Chambers• Design of Equalization and Neutralization Tank• Design of Oil and Grease trap & floatation devices• Design of Rapid Mixers and Flocculators• Design of Primary Sedimentation units	15	35
2	Secondary Treatment Units for Wastewater: [A] Aerobic Treatment Units: <ul style="list-style-type: none">• Design of Activated sludge process• Design of Secondary Sedimentation Tank• Design of Rotating biological contractor• Design of Bio-tower• Design of Sequential batch reactor [B] Anaerobic Treatment Units: <ul style="list-style-type: none">• Design of Upflow anaerobic sludge blanket reactor• Design of Sludge Digesters	15	35
3	Sludge Treatment Units: <ul style="list-style-type: none">• Design of Sludge Drying Beds• Design of Filter Press	07	12
4	Design of Advanced Treatment Units <ul style="list-style-type: none">• Design of Membrane Bio reactor• Dose calculation for Adsorption• Design of Membrane Units• Design of Electro-Coagulation Unit• Design of Ion-Exchange units• Strippers for Ammonia and VOCs from wastewater	08	18
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	10	15	15	25	25

Where R:Remember; U:Understanding; A:Application, N:Analyze and E:Evaluate C:Create(as per Revised Bloom's Taxonomy)



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References/Suggested Learning Resources:

(a) Books:

- Waste Water Treatment, disposal & reuse - Metcalf & Eddy.
- Wastewater treatment plant: By Qasim
- Waterworks Engineering: By Qasim
- Biological Process Design for Wastewater Treatment: By Benefield and Randall
- Manual on Sewage Collection and Treatment

(b) Open sources of software and website:

- US-EPA
- NPTEL

Suggested Activities for Students:

- Industrial wastewater treatment plant visit.
- Common Effluent Treatment Plant Visit.
- Sewage Treatment Plant Visit.
