



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3161306

Semester – VI

Subject Name: Design of water Treatment Units

Type of course: Applied Science

Prerequisite: Knowledge of subject Physico -chemical Treatment Technologies

Rationale: To learn the procedure and calculations for design of water treatment plant

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	2	0	5	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	Sources of water and water treatment schemes: <ul style="list-style-type: none">Regulatory water quality standardsSelection criteriaSurface water treatment SchemeGround water treatment Scheme	2
2	Design of Parshall Flume for flow measuring <ul style="list-style-type: none">Design equations and design of Parshall Flume	3
3	Design of Coarse Screen and Fine Screen for water treatment <ul style="list-style-type: none">Design CriteriaDesign of Coarse ScreenDesign of Fine Screen	6
4	Design of Rapid mixers & flocculators <ul style="list-style-type: none">Design Criteria & Design of Rapid mixersDesign Criteria & Design of Flocculators	5
5	Design of Clariflocculator, Primary Sedimentation Tank & Tube Settlers for water treatment <ul style="list-style-type: none">Design criteria and design of ClariflocculatorDesign criteria and design of Primary Sedimentation TankDesign criteria and design of Tube Settlers	8
6	Design of Rapid Sand Filtration Systems for water treatment <ul style="list-style-type: none">Design criteria and design of Rapid Sand Filters with under drainage system	5
7	Design of Disinfection Unit <ul style="list-style-type: none">Design criteria and design of Chlorine Contact Tank	2
8	Detailed Design of Water Treatment Plant with Layout and hydraulic profile	4
9	Water treatment plant residuals <ul style="list-style-type: none">Solid computationsSolid Production and CharacteristicsMinimization of Residuals Generation	2



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Sr. No.	Content	Total Hrs
	<ul style="list-style-type: none">Recovery of Treatment ChemicalsResiduals ConveyanceManagement of Sludges & Liquid ResidualsDisposal of Specific Residuals	
10	Special water treatment for Specific Parameters <ul style="list-style-type: none">Water softening with dose calculationsIron and Manganese, Arsenic removalDefluoridation systemsCascade Aeration for ground water	5

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
10	10	15	10	10	15

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:

- Design of Water Treatment Plants by Dr A G Bhole Published by Indian Water Works Association
- Water Works Engineering Planning, Design & operation by Syed R Qasim, Edward M Motley & Guang Zhu Published by Prentice Hall of India.
- Environmental Engineering – A design approach by Arcadio P. Sincero & Grecjoria A. Sincero (Prentice Hall of India).
- Water Quality and treatment Published by American Water Works Association

Course Outcomes:

Sr. No.	CO statement	Marks %Weightage
CO1	Identify and describe appropriate water treatment schemes	5
CO2	Design and drawing of flow measuring unit, screens, mixing units and sedimentation units	50
CO3	Design and drawing of filtration unit, disinfection unit with treatment of plant residuals	35
CO4	Identify and design special water treatment for specific parameters	10

List of Tutorials:

- Sketches and description of treatment schemes for surface and ground water sources.
- Design of Parshall Flume for flow measuring devices for water treatment.
- Design of rapid mixers and flocculators with detailed drawing sheets
- Design of Clariflocculator with detailed drawing sheet
- Design of Primary Sedimentation tank and tube settler with detailed drawing sheets
- Design of rapid sand filter with detailed drawing sheet



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7. Design of Chlorine Contact Tank
8. Numericals on water softening calculations
9. Assignment on Iron and manganese removal, Defluoridation systems and Cascade Aeration for ground water
10. Assignment on Water Treatment Plant Residuals
11. Assignment on Detailed Design of Water Treatment Plant with Layout and hydraulic profile with drawing sheets