GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3173525
Semester – VII
Subject Name: Cleaner Production and Waste Utilization

Type of course: Open Elective

Prerequisite: -

Rationale: This course provides knowledge of industrial waste water treatment options.

Teaching and Examination Scheme:

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

Content:

Sr. No.	Content	Total Hrs
1.	**Cleaner Production:** Cleaner production concept, Theory of cleaner production, Effect of CP on Industrial economy. Cleaner Methodology Six steps methodology for CP, Designation of cleaner production team, Analyze process steps, generating cleaner production opportunities, selecting cleaner production solutions, Implementation, maintaining cleaner production.	10
2.	Good House Keeping What is good Housekeeping? What is needed to implement good housekeeping? Check lists for GHK. Energy Audit Methodology Introduction, preliminary or walk-through energy Audit, Detailed energy audit. Financial Analysis Cleaner Production.	08
3.	**Case Studies:** **Waste Utilization:** Recycling & Reuse: Concept and application, Recycling and reuse of liquid industrial waste in different industries.	10
4.	Recycling and reuse of solid industrial waste. Waste Heat recovery from flue gases, Waste heat Recovery boilers Types of heat exchangers,	08

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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
15	**15**	**10**	**15**	**15**	**0**

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:

1. GCPC manual
2. Industrial Water Pollution Origins, Characteristics and Treatment – by Nelson Nemaro

Course Outcome:

After learning this course students will be able to:

Sr No	CO Statement	Marks Weightage%
CO-1	Examine C.P. tools for Cleaner production	25
CO-2	Classify C.P. methodology	25
CO-3	Develop heat recovery system for industries	25
CO-4	Differentiate different types of heat exchangers for waste heat recovery	25