Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3171304 **Date: 05/06/2026**

Subject Name: Cleaner Production and Waste Utilization

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Define Cleaner Production and explain its importance in reducing industrial pollution.	**03**
	(b)	State economic benefits of adopting Cleaner Production.	**04**
	(c)	Apply the six-step methodology of Cleaner Production to a textile industry example.	**07**
Q.2	**(a)**	Represent the hierarchy of cleaner production.	**03**
	(b)	Analyze how financial analysis supports decision-making in Cleaner Production adoption.	**04**
	(c)	Evaluate a case study where Cleaner Production improved both environmental and economic performance.	**07**
		OR	
Q.2	**(c)**	Propose a Cleaner Production plan for a chemical industry highlighting financial feasibility.	**07**
Q.3	**(a)**	List the objectives of conducting an energy audit.	**03**
	(b)	Analyze the differences between preliminary and detailed energy audits with examples.	**04**
	(c)	Design an energy audit strategy for a medium-scale food processing unit.	**07**
		OR	
Q.3	**(a)**	Define preliminary (walk-through) energy audit.	**03**
	(b)	How to identify energy loss in a boiler system through energy audit methodology.	**04**
	(c)	Discuss the outcomes of an energy audit conducted in a cement industry.	**07**
Q.4	**(a)**	Define recycling and reuse with one example each.	**03**
	(b)	List two methods of recycling liquid industrial waste.	**04**
	(c)	Suggest an integrated recycling and reuse system for a sugar industry.	**07**
		OR	
Q.4	**(a)**	Discuss with respect to CP: (i) Technical feasibility (ii) Evolution of Environmental Aspects (iii) Economic Viability.	**03**
	(b)	Analyze the environmental benefits of recycling solid industrial waste.	**04**
	(c)	Suggest an integrated recycling and reuse system for a dairy processing plant	**07**
Q.5			

	(a)	List out types of waste heat recovery equipment.	**03**
	(b)	Analyze the role of waste heat recovery boilers in energy conservation.	**04**
	(c)	Evaluate different waste heat recovery pathways in the cement industry.	**07**

OR

Q.5	**(a)**	Define Waste Heat Recovery and state its significance.	**03**
	(b)	Discuss the concept of LMTD.	**04**
	(c)	Propose a waste heat recovery system for a thermal power plant with justification.	**07**

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