Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 711605N **Date: 30-12-2013**

Subject Name: Cleaner Production in Chemical Industries

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	Discuss principles of green chemistry to reduce environment impact of products.	07
	(b)	Differentiate “End of the pipe” and “Cleaner Production “ approaches.	07
Q.2	(a)	What are the different steps involved in cleaner production methodology for doing cleaner production exercise in any chemical industry?	07
	(b)	What are the different barriers to cleaner production? How to overcome those barriers?	07
		OR	
	(b)	Discuss the energy transformation and importance of second law of thermodynamic in order to minimize wastes in chemical process industry.	07
Q.3	(a)	Enlist benefits of good house keeping.	07
	(b)	Define the energy audit as per the energy conservation Act 2001?	02
		Explain with examples fuel substitution and energy substitution.	05
		OR	
Q.3	(a)	List steps involved in ‘detailed energy audit’.	07
	(b)	List some of the direct and indirect benefits of waste heat recovery systems.	02
		Mention any three commercial waste heat recovery devices.	02
		Explain with a neat sketch the function of an economizer?	03
Q.4	(a)	Why is Material and Energy balance important for Waste minimisation programmes?	02
		Explain in detail source reduction technique of waste minimisation?	05
	(b)	Discuss industrial technology in chemical process industry where conventional technology is replaced by cleaner production for production of bulk drug or Pharmaceuticals.	07
		OR	
Q.4	(a)	Discuss cleaner production for production of any one petrochemical product in detail.	07
Q.4	(b)	What are the implications of climate change?	03
		Write about Indian initiatives on CDM.	04
Q.5	(a)	Write a note: Ozone depletion & Montreal Protocol	07
	(b)	Write a note: Process integration-A new approach to waste minimization.	07
		OR	
Q.5	(a)	Discuss concept of Industrial green technology with India’s perspective.	07
	(b)	Discuss role of biocatalysis in revolutionizing synthetic processes citing examples.	07

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