Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2153611 **Date:17/12/2015**

Subject Name: Green Chemistry For Technologist

Time:10:30am to 1:00pm **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)**	Explain in detail the manufacturing involved in Hydrogen Peroxide. Discuss and compare both Conventional vs. Green route.	**07**
	(b)	Define Ionic liquids. What are characteristic properties of ionic liquids?	**07**
Q.2	**(a)**	Explain in detail the manufacturing involved in Hydrazine. Discuss and compare both Conventional vs. Green route.	**07**
	(b)	Provide Green Route of Synthesizing the following (a) Epichlorohydrin (b) Propylene Oxide (c) Phenol	**07**
		OR	
	(b)	Explain in brief harmful effects of Lead, Asbestos and Mercury pollution.	**07**
Q.3	**(a)**	Elaborate the statement –"Microwave heating as a greener technology". What types of vessels are used in Microwave irradiation?	**07**
	(b)	Explain Envirogluv^{TM} process to print top-quality labels directly on glass, replacing paper labels, decals, or applied ceramic labeling.	**07**
		OR	
Q.3	**(a)**	What are supercritical fluids? What is supercritical CO_2? What are its advantages?	**07**
	(b)	Explain in detail TAML^{TM} activators and how they mimic the peroxidase enzymes.	**07**
Q.4	**(a)**	Discuss the advantageous points with water as solvent in comparison to organic solvents.	**07**
	(b)	Write down the twelve basic principles of green chemistry. Explain any three principles of 'Green Chemistry' <u>excluding</u> atom economy, with examples	**07**
		OR	
Q.4	**(a)**	Provide Green Route of Synthesizing the following (a) Aniline (b) Ibuprofen (c) Isocyanates	**07**
	(b)	Define 'Process Intensification'. Enlist design considerations for process intensification and characteristics of an intensified process.	**07**
Q.5	**(a)**	What is sonication? What effect is responsible for supplying energy in sonication? Explain your answer with suitable examples.	**07**
	(b)	Write an elaborate note on solvent free organic synthesis as a versatile tool in green chemistry, citing suitable examples.	**07**
		OR	
Q.5	**(a)**	Explain benefits of 'Green Chemistry' to human health, environment and economy & business.	**07**

(b) Bromoethane may be synthesized by following two routes **07**

(I) Bromoethane can be produced from the reactants ethene (ethylene) and hydrogen bromide in an <u>addition reaction</u>.

$C_2H_4 + HBr \rightarrow C_2H_5Br$

(II) Bromoethane can also be manufactured using the reactants ethane and bromine in a substitution reaction

$C_2H_6 + Br_2 \rightarrow C_2H_5Br + HBr$

What is the % atom economy of both the reactions?

What advantages would be there if route (I) was offered as a green chemistry alternative for the production of Bromoethane.

****