

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V(New) • EXAMINATION – WINTER 2016****Subject Code:2153611****Date:24/11/2016****Subject Name:Green Chemistry for Technologists****Time:10:30 AM to 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.

		MARKS
Q.1	Short Questions	14
	1 What is Green Chemistry?	
	2 What are auxiliaries?	
	3 Explain atom economy.	
	4 What is catalysis?	
	5 Cold process of synthesis of phenol.	
	6 Harmful effect of Asbestos.	
	7 Suggest alternate greener solvent for hexane.	
	8 Give two examples of polymer from renewable source.	
	9 Explain Envirogluv TM .	
	10 Environmental effects of Hg.	
	11 Two main qualities of Green catalyst.	
	12 Explain design for degradation or persistent pollutants.	
	13 Pick two green solvents among:2-Propanol, pyridine, Methanol, Dioxane	
	14 Pollution through Lead.	
Q.2	(a) Explain in detail TAML TM activators.	03
	(b) Define 'Process Intensification'. Elaborate with suitable examples.	04
	(c) How green solvents are different from organic solvents. How difficulties associated with organic solvents can be removed by green solvents.	07
	OR	
	(c) Explain twelve principles of Green Chemistry, with suitable examples.	07
Q.3	(a) Provide conventional and green route for synthesis of aniline (one each).	03
	(b) Elaborate use of catalysts in green chemistry principles. Give suitable examples for the same	04
	(c) Write an elaborate note on solvent free organic synthesis as a versatile tool in green chemistry, citing suitable examples.	07
	OR	
Q.3	(a) How sonochemistry is associated with green chemistry, explain?	03
	(b) Why does industry need Green Chemistry?	04
	(c) Ethanol may be synthesized by following two routes (in presence of catalyst):	07
	I. $\text{CH}_2=\text{CH}_2 + \text{H}_2\text{O} \longrightarrow \text{C}_2\text{H}_5\text{OH}$	
	II. $\text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow \text{C}_2\text{H}_5\text{OH} + \text{CO}_2$	
	What is the % atom economy of both the reactions?	
	Which route is to be considered greener for the production of Ethanol in your opinion, give reasons of your answer?	
Q.4	(a) Write a note on microwave reactions.	03
	(b) Explain principle of reduced derivatives.	04
	(c) Write an elaborate note on solvent free organic synthesis as a versatile tool in green chemistry, citing suitable examples.	07

OR

- Q.4** (a) Explain safer chemicals design, with examples. **03**
(b) Provide green route for the synthesis of Ibuprofen. **04**
(c) Compare and contrast, classical vs greener routes for manufacturing of hydrogen peroxide. **07**
- Q.5** (a) Write a note on minimization of pollution via greener routes of synthesis. **03**
(b) Calculate atom economy of butyl bromide in the following reaction: **04**



- (c) Define ionic liquids. Why they are considered as green? Give three examples of chemical reactions where ILs have been utilized. **07**

OR

- Q.5** (a) How hydrazine is being manufactured via greener routes? **03**
(b) How green chemistry is different from general chemistry? **04**
(c) Are supercritical fluids green in nature? Elaborate your answer with the help of CO₂. **07**
