GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering (Minor/Honours Degree Syllabus)

Subject Code : N114AS01

Subject Name : Introduction to Green Technology

WEF Academic Year :	2024-25
Semester :	4
Category of the Course :	Compulsory

Prerequisite : Student should have basic knowledge of environment and pollution.

Rationale :

This course is designed to have in-depth knowledge about environment and various types of pollutions. It also focuses on principles of green technology. It emphasizes on substitution of conventional toxic, hazardous material by less toxic, green material. Study of different environment friendly processes helps to reduce the harmful effects on the environment.

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
03	00	02	04	70	00	30	00	100

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	The twelve Principles of Green Chemistry and green engineering with examples.	4	5
2	Green chemistry metrics- atom economy, E factor, reaction mass efficiency and other green chemistry metrics, application of green metrics analysis to synthetic plans.	4	15
3	Waste – sources of waste, different types of waste, chemical, physical and biochemical methods of waste minimization and recycling.	4	10
4	Pollution – types, causes, effects and abatement .	5	10
5	Environmentally benign processes- alternate solvents- supercritical solvents, ionic liquids, water as a reaction medium, energy efficient design of processes- photo, electro and sono chemical methods, microwave assisted reactions.	6	15
6	Green reagents and catalysis in green synthesis.	4	10

7	Designing green processes- safe design, process intensification, in process monitoring.	4	10
8	Safe product and process design – Design for degradation, Real-time Analysis for pollution prevention, inherently safer chemistry for accident prevention.	6	15
9	Industrial case studies.	5	10
	Total	**42**	

Reference Books :

1) Green Chemistry- An introductory text - M. Lancaster, RSC
2) Green chemistry metrics - Alexei Lapkin and David J.C. Constable (Eds), Wiley publications
3) Environmental chemistry - Stanley E Manahan, Lewis Publishers

Course Outcome :

After Completion of the Course, Student will able to :

Sr. No	Course Outcomes	RBT Level*
01	CO1- Explain the principles of green chemistry and engineering.	UN
02	CO2- Classify various waste material and explain methods for its minimization.	UN
03	CO 3- Outline types of pollutions and its mitigation techniques.	AP
04	CO 4- Design processes those are benign and environmentally viable.	AN
05	CO 5- Design and modify processes and products to make them green safe and economically acceptable.	AP

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

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