



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor Engineering

Branch: Green Technology and Sustainability Engineering

Course/Subject Code: 3174406

Course/Subject Name: Green Industrial Processes

W. E. F. Academic Year:	2024-25
Semester:	VII <sup>th</sup>
Category of the Course:	Professional Elective

<b>Prerequisite:</b>	Basic Science
<b>Rationale:</b>	The objective of this course is to study the principles of green technology application in industries. The main goal is to understand several industrial processes that could be carried out in an economical and environmental friendly way.

## Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand the basics of green technology and their applications in the domain of engineering
02	Understand the green energy generation by solar and wind route
03	To impart fundamental knowledge of photocatalysis
04	Understand the importance and role of green hydrogen generation
05	Understand the solid waste management methodology

## Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial/ Practical		
				ESE (E)	PA/ CA (M)	PA/CA (I)	ESE (V)	
3	0	0	3	70	30	0	0	100

## Course Content:

Unit No.	Content	No. of Hours	%of Weightage
1.	<b>Fundamentals of green technology</b> Economical green processes for societal benefit, productivity and sustainability, concept of manufacturing and operations, developing a green smart factory.	07	10
2.	<b>Green energy</b>	10	20

	Solar power generation, fundamentals of solar collectors and concentrators, overview of solar energy conversion devices and applications, estimation of solar radiation under different climatic conditions, overview of wind as renewable energy, wind energy conversion, site selection, wind energy conservation system, applications of wind energy.		
<b>3.</b>	<b>Photocatalysis</b> Introduction of heterogeneous photocatalysis, synthesis and properties of photocatalyst, characterization of visible light responsive semiconductor photocatalyst, industrial effluent treatment by green processes.	10	30
<b>4.</b>	<b>Green hydrogen generation</b> Properties of hydrogen, global status of supply and demand, methods of hydrogen generation through routes like photocatalytic water splitting and other methods, hydrogen storage, transportation and safety concept.	08	20
<b>5.</b>	<b>Solid waste management</b> Classification of solid waste, conventional methods of waste collection and disposal, efficient application of solid wastage, recycling of solid wastes, recent advances in solid waste management.	10	20
<b>Total</b>		<b>45</b>	<b>100</b>

<b>Distribution of Theory Marks</b>					
<b>R Level</b>	<b>U Level</b>	<b>A Level</b>	<b>N Level</b>	<b>E Level</b>	<b>C Level</b>
10	30	20	20	10	10

Where R: Remember, U: Understanding, A: Application, N: Analyze, E: Evaluate, C: Create (as per Revised Bloom's Taxonomy)

**Reference Books:**

1. Dornfeld, D.A. ed., 2012. Green manufacturing: fundamentals and applications. Springer Science & Business Media.
2. Seliger, G., Khraisheh, M.M. and Jawahir, I.S. eds., 2011. Advances in sustainable manufacturing. Springer Science & Business Media
3. M. A. Green, Third Generation Photovoltaics: Advanced Solar Energy Conversion, Springer, 2003
4. Solar Energy: Principles of Thermal Collections and Storage, S. P. Sukhatame and J. K. Nayak, Tata McGraw Hill, New Delhi
5. Energy Technology by Rao and Parulekar.

**List Learning Resources Required:**

Students can refer to video lectures available on the websites including NPTEL

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