Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– VI EXAMINATION – SUMMER 2026

Subject Code:3160514 Date:26-05-2026

Subject Name: Green Technology and sustainable Development

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Explain the term green chemistry and its importance with suitable example.	**03**
	(b)	Differentiate the green chemistry and green products with ordinary chemistry and products.	**04**
	(c)	Illustrate the concept of process intensification with neat and clean diagram.	**07**
Q.2	**(a)**	Define green synthesis with suitable example.	**03**
	(b)	Discuss the microwave assistant reactions in detailed explanation.	**04**
	(c)	Demonstrate the three principal dimensions of sustainable development with suitable examples.	**07**
		OR	
	(c)	Write a brief note on, “synthesis of green reagents and their applications”.	**07**
Q.3	**(a)**	Explain in brief. “Sustainability challenges and possibilities”	**03**
	(b)	Classify the various green industrial processes.	**04**
	(c)	Explain in detail. “The greener approach towards reduction of pollution for pharmaceutical industries”.	**07**
		OR	
Q.3	**(a)**	Discuss in detail. “Green solvents”.	**03**
	(b)	Justify the role of industry in cleaner production technology.	**04**
	(c)	Explain in detail. “The greener approach towards reduction of pollution for polymer industries”.	**07**
Q.4	**(a)**	Describe in detail. “The cleaner production tools”.	**03**
	(b)	Write a brief note on “Good House Keeping”.	**04**
	(c)	Justify the role of cleaner production in achieving sustainability	**07**
		OR	
Q.4	**(a)**	Discuss in brief. “ The Cleaner Production and its principles”	**03**
	(b)	Enlist the pros and cons of Cleaner Production.	**04**
	(c)	Explain in detail about the Fluoride removal from wastewater via cleaner production technology.	**07**

Q.5	**(a)**	Define the energy conservation as a tool for cleaner production.	**03**
	(b)	Explain the Environmental Management Hierarchy.	**04**
	(c)	Explain the greener approach towards reduction of pollution for Pharmaceutical and dyes industries.	**07**

OR

Q.5	**(a)**	Justify the relation of cleaner production (CP) and environmental management system (EMS)	**03**
	(b)	Discuss any one unit operation involved to generate a cleaner product.	**04**
	(c)	Classify the energy audit methods in detail with suitable example.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160514 Date:26-05-2025

Subject Name: Green Technology and sustainable Development

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Discuss the importance of green solvents with examples.	**03**
	(b)	Define ionic liquid with suitable examples.	**04**
	(c)	Enlist the principles of Green Chemistry. Describe any three in detail.	**07**
Q.2	**(a)**	Discuss advantage and disadvantage of cleaner production in chemical process industries.	**03**
	(b)	Describe the company's responsibilities to employ the green emerging technologies for sustainable development.	**04**
	(c)	Describe cleaner production techniques to produce Diethyl Malonate.	**07**
		OR	
	(c)	Explain three principal dimensions of sustainable development with suitable examples.	**07**
Q.3	**(a)**	Explain the role of chemical engineering in green technology.	**03**
	(b)	Explain the concept of green nanotechnology.	**04**
	(c)	Discuss role of cleaner production in sustainable development of chemical industries.	**07**
		OR	
Q.3	**(a)**	Discuss in brief the green laws compliance.	**03**
	(b)	Discuss energy conservation as a tool for cleaner production.	**04**
	(c)	Describe the applications of Cleaner Production Principles with reference to minimize waste liquid effluent to produce Paracetamol in detail.	**07**
Q.4	**(a)**	Enlist the various responsibilities of companies towards cleaner production.	**03**
	(b)	Discuss in brief about major challenges for implementing green technology in a chemical industry.	**04**
	(c)	Discuss the greener approach in polymer and textile industries to reduce pollution.	**07**
		OR	
Q.4	**(a)**	Enlist the cleaner Production Tools.	**03**
	(b)	Discuss the benefits of Good House Keeping.	**04**
	(c)	Explain cleaner production concept with Fluoride removal from wastewater as a case study.	**07**
Q.5	**(a)**	Explain the term Process intensification in brief.	**03**
	(b)	Define the photochemical reactions with suitable example.	**04**
	(c)	Discuss in detail the methodology of energy audit.	**07**
		OR	
Q.5	**(a)**	Define: Source Reduction, Cleaner Technology, Good Housekeeping	**03**
	(b)	Explain the Environmental Management Hierarchy.	**04**
	(c)	Explain the greener approach dyes and pesticides industries to reduce pollution.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160514 Date:20-05-2024

Subject Name:Green Technology and sustainable Development

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain the concept of Process Intensification.	**03**
	(b)	Discuss the role of a chemical engineer in Green Technology and Sustainable Development.	**04**
	(c)	Enlist all 17 Sustainable Development Goals (SDGs) and explain any three goals in details.	**07**
Q.2	**(a)**	Enlist the principles of Green Chemistry.	**03**
	(b)	Explain the concept of Green Nanotechnology.	**04**
	(c)	Discuss how a systems approach helps in achieving sustainable development goals.	**07**
		OR	
	(c)	Discuss the various challenges in achieving sustainability.	**07**
Q.3	**(a)**	Explain briefly the three principal dimensions of Sustainable Development.	**03**
	(b)	Explain briefly about Supercritical CO_2 as a green solvent.	**04**
	(c)	Discuss the greener approaches for pollution reduction in polymer and pesticides industries.	**07**
		OR	
Q.3	**(a)**	Explain the concept of Cleaner Production (CP).	**03**
	(b)	Explain the importance of Ultrasound assisted reactions towards green synthesis.	**04**
	(c)	Discuss the greener approaches for pollution reduction in textile and dyes industries.	**07**
Q.4	**(a)**	Enlist the tools used for cleaner production.	**03**
	(b)	Explain the methodology involved for effectively carrying out cleaner production.	**04**
	(c)	Explain the merits and demerits of cleaner production in process industries.	**07**
		OR	
Q.4	**(a)**	Write a short note on the relation between Cleaner Production (CP) and Energy Management System (EMS).	**03**
	(b)	Describe in brief the role of cleaner production in achieving sustainability.	**04**
	(c)	Discuss the role of industries, government, and institutions in successful implementation of cleaner production.	**07**

Q.5	**(a)**	Write a short note on Photochemical reactions.	**03**
	(b)	Explain the Green laws compliance with suitable example.	**04**
	(c)	Discuss in detail the application of cleaner production principles in relation to the reuse of liquid industrial waste from many industries.	**07**

OR

Q.5	**(a)**	Discuss briefly about the role of Ionic Liquids in green synthesis.	**03**
	(b)	Write a short note on Green Productivity and emerging technologies.	**04**
	(c)	Discuss in detail the application of cleaner production principles in relation to the recovery of Ammoniacal Nitrogen from wastewater.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160514 Date:10-07-2023

Subject Name:Green Technology and sustainable Development

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Explain the concept of green chemistry.	**03**
	(b)	Discuss the importance of green chemistry and its role in chemical industry.	**04**
	(c)	Discuss the classification of Process intensification with suitable example.	**07**
Q.2	**(a)**	List out the major challenges for implementing green technology in a chemical industry	**03**
	(b)	Define the photochemical reactions with suitable example.	**04**
	(c)	Write a brief note on, “Green solvents and their importance and applications”	**07**
		OR	
	(c)	Explain the three principal dimensions of sustainable development with suitable examples..	**07**
Q.3	**(a)**	Explain in brief. “Process intensification”	**03**
	(b)	Discuss the role of government and institution in cleaner production technology.	**04**
	(c)	Explain the greener approach towards reduction of pollution for dyes and pesticides industries.	**07**
		OR	
Q.3	**(a)**	Discuss in detail sustainable development in detail.	**03**
	(b)	Discuss the role of cleaner production in sustainable development.	**04**
	(c)	Explain the greener approach towards reduction of pollution for waste water industries and textile industries.	**07**
Q.4	**(a)**	Enlist the four principles of Cleaner Production.	**03**
	(b)	Discuss the benefits of Good House Keeping.	**04**
	(c)	Explain the following cleaner production with case study. “Fluoride removal from wastewater”	**07**
		OR	
Q.4	**(a)**	Enlist the cleaner Production Tools.	**03**

	(b)	Discuss the merits and demerits of Cleaner Production.	**04**
	(c)	Discuss process change as 'Source of Waste reduction'.	**07**
Q.5	**(a)**	Discuss the type of energy Audit.	**03**
	(b)	Discuss role of CP in survival and sustainable development of chemical industries.	**04**
	(c)	Discuss in detail applications of "Cleaner Production Principles" with special reference to liquid effluent waste minimization for the following industrial products: (1) H-acid & (2) Paracetamol.	**07**

OR

Q.5	**(a)**	Define:- (1) Source Reduction (2) Cleaner Technology (3) Good Housekeeping	**03**
	(b)	Explain the Environmental Management Hierarchy.	**04**
	(c)	Discuss the energy audit methodology and its steps.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160514 Date:06/06/2022

Subject Name:Green Technology and sustainable Development

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.**
4. **Simple and non-programmable scientific calculators are allowed..**

			MARKS
Q.1	**(a)**	Explain the role of chemical engineering in green technology.	**03**
	(b)	Discuss in brief about major challenges for implementing green technology in a chemical industry.	**04**
	(c)	Enlist the twelve principles of green chemistry and discuss them in detail.	**07**
Q.2	**(a)**	Define ionic liquid with suitable example.	**03**
	(b)	Describe the synthesis of Dimethyl Carbonate as a green reagent in chemical industry.	**04**
	(c)	Explain the importance of Microwave and Ultrasound assisted reactions towards green synthesis. Give example of anyone.	**07**
		OR	
	(c)	Explain the importance of green solvents towards green synthesis with few examples.	**07**
Q.3	**(a)**	Define process intensification.	**03**
	(b)	Explain the concept of Sustainable Development	**04**
	(c)	Explain the greener approach towards reduction of pollution for polymer and textile industries.	**07**
		OR	
Q.3	**(a)**	Enlist the three principal dimensions of Sustainable Development.	**03**
	(b)	Explain the concept of green nanotechnology.	**04**
	(c)	Explain the greener approach towards reduction of pollution for pharmaceutical and dyes industries.	**07**
Q.4	**(a)**	Explain the concept of cleaner production (CP).	**03**
	(b)	Discuss the environmental management hierarchy with reference to cleaner production.	**04**
	(c)	Discuss cleaner production with reference to wastewater minimization in Diethyl Malonate production.	**07**
		OR	
Q.4	**(a)**	Explain the various barriers and motivators in cleaner production.	**03**
	(b)	Enlist cleaner production tools and discuss their methodology and applications.	**04**
	(c)	Discuss role of cleaner production in survival and sustainable development of chemical industries.	**07**
Q.5	**(a)**	Discuss in brief the green laws compliance.	**03**

	(b)	Discuss one unit operation in detail which can help create a cleaner product	**04**
	(c)	Discuss in detail applications of "Cleaner Production Principles" with special reference to liquid effluent waste minimization for the production of Paracetamol.	**07**

OR

Q.5	**(a)**	Enlist the various responsibilities for action of companies towards cleaner production.	**03**
	(b)	Discuss energy conservation as a tool for cleaner production	**04**
	(c)	Describe the "Principles of Process Optimization" to achieve Waste Minimization in a plant producing "Vinyl Acetate (VA)".	**07**

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