Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI EXAMINATION – WINTER 2025

Subject Code: 3160514 Date: 19-11-2025

Subject Name: Green Technology and sustainable Development

Time: 02:30 PM TO 05:00 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)**	Define process intensification.	**03**
	(b)	Explain the concept of Sustainable Development	**04**
	(c)	Enlist the twelve principles of green chemistry and discuss them in detail.	**07**
Q.2	**(a)**	Explain the concept of cleaner production (CP).	**03**
	(b)	Discuss the barriers and motivators in cleaner production in process industries.	**04**
	(c)	Enlist various cleaner production tools and discuss their working methodology and applications in chemical industries.	**07**
		OR	
	(c)	Discuss cleaner production with reference to wastewater minimization in Diethyl Malonate production.	**07**
Q.3	**(a)**	Discuss the role of chemical engineering in green technology.	**03**
	(b)	Define ionic liquid with suitable examples.	**04**
	(c)	Explain the importance of Microwave and Ultrasound assisted reactions towards green synthesis. Give example of anyone.	**07**
		OR	
Q.3	**(a)**	Discuss in brief the green laws compliance	**03**
	(b)	Enlist the three principal dimensions of Sustainable Development and explain anyone in detail.	**04**
	(c)	Explain the importance of green solvents towards green synthesis with few examples.	**07**
Q.4	**(a)**	Explain the individual responsibility towards Sustainable Development.	**03**
	(b)	Explain the environmental management hierarchy.	**04**
	(c)	Explain the greener approach towards reduction of pollution for pesticides industries.	**07**
		OR	

Q.4	**(a)**	Discuss the company's responsibilities to employ the green emerging technologies for sustainable development.	**03**
	(b)	Discuss one unit operation in detail which can help create a cleaner product.	**04**
	(c)	Explain the greener approach towards reduction of pollution for pharmaceutical and dyes industries.	**07**
Q.5	**(a)**	Discuss the relation between CP and EMS.	**03**
	(b)	Describe the synthesis of Dimethyl Carbonate as a green reagent in chemical industry.	**04**
	(c)	Illustrate the "Principles of Process Optimization" to achieve Waste Minimization in a plant producing "Vinyl Acetate (VA)" or any other example.	**07**

OR

Q.5	**(a)**	Explain the concept of green nanotechnology.	**03**
	(b)	Explain why using reactions with high atom economy is important for sustainable development.	**04**
	(c)	Discuss in detail applications of "Cleaner Production Principles" with special reference to liquid effluent waste minimization for the following industrial products: (i) H-acid & (ii) Paracetamol.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3160514 Date:28-11-2024

Subject Name:Green Technology and sustainable Development

Time:02:30 PM TO 05:00 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)	Explain why using reactions with high atom economy is important for sustainable development.	**04**
	(c)	Discuss the classification of Process intensification with suitable example.	**07**
Q.2	**(a)**	Explain the concept of Green Nanotechnology.	**03**
	(b)	Describe the synthesis of Dimethyl Carbonate as a green reagent in chemical industry.	**04**
	(c)	Explain the three principal dimensions of sustainable development with suitable examples.	**07**
		OR	
	(c)	What are the measures for overcoming the challenges of sustainable development goals?	**07**
Q.3	**(a)**	Explain the concept of cleaner production (CP).	**03**
	(b)	Define green oxidation reaction with a suitable example.	**04**
	(c)	Explain the greener approach towards reduction of pollution for dyes and pesticides 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 waste water industries and textile industries.	**07**
Q.4	**(a)**	Discuss the benefits of Good House Keeping.	**03**
	(b)	Enlist cleaner production tools and discuss their methodology and applications.	**04**
	(c)	Discuss process change as ‘Source of Waste reduction’.	**07**
		OR	
Q.4	**(a)**	Define photochemical reactions with suitable examples.	**03**
	(b)	Explain the importance of Ultrasound assisted reactions towards green synthesis.	**04**
	(c)	Discuss cleaner production with reference to wastewater minimization in Diethyl Malonate production.	**07**
Q.5	**(a)**	Discuss the importance of green solvents	**03**
	(b)	Explain the Environmental Management Hierarchy.	**04**

	(c)	Describe the "Principles of Process Optimization" to achieve Waste Minimization in a plant producing "Vinyl Acetate (VA)".	**07**

OR

Q.5	**(a)**	Discuss the type of energy Audit.	**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 following industrial products: (1) H-acid & (2) Paracetamol.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3160514 Date:07-12-2023

Subject Name: Green Technology and sustainable Development

Time:02:30 PM TO 05:00 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)**	Discuss Green Processes in detail.	**03**
	(b)	Define process intensification (PI) and explain the role of PI in sustainable development.	**04**
	(c)	Enlist the 12 principles of Green Chemistry. Explain any three in detail.	**07**
Q.2	**(a)**	Enlist the 17 sustainable goals.	**03**
	(b)	Discuss three pillars of sustainability.	**04**
	(c)	Describe sustainability challenges and possibilities for major technical systems and for their transformation to meet sustainability requirements.	**07**
		OR	
	(c)	What are the measures for overcoming the challenges of sustainable development goals?	**07**
Q.3	**(a)**	Explain the concept of cleaner production (CP).	**03**
	(b)	Discuss the Environmental Management Hierarchy.	**04**
	(c)	Discuss CP case studies: Ammonical nitrogen recovery from wastewater.	**07**
		OR	
Q.3	**(a)**	Write the definition of Cleaner Production and Waste.	**03**
	(b)	Discuss the merits and demerits of CP.	**04**
	(c)	Enlist Cleaner Production tools and Discuss them in detail.	**07**
Q.4	**(a)**	Define green oxidation reaction with a suitable example.	**03**
	(b)	Describe the synthesis of Dimethyl Carbonate as a green reagent in the chemical industry.	**04**
	(c)	Explain the concept of green nanotechnology with suitable examples.	**07**
		OR	
Q.4	**(a)**	Define photochemical reactions with suitable examples.	**03**
	(b)	Explain why using reactions with a high atom economy is important for sustainable development.	**04**
	(c)	Explain the benefits and limitations of ultrasound & microwave-assisted reactions toward sustainable development.	**07**
Q.5	**(a)**	Discuss the green laws compliance.	**03**
	(b)	Define ionic liquid with suitable examples.	**04**
	(c)	Explain the greener approach towards the reduction of pollution for polymer and textile industries.	**07**
		OR	
Q.5	**(a)**	Discuss the importance of green solvents.	**03**
	(b)	Describe the synthesis of green reagents with a suitable example.	**04**
	(c)	Explain the greener approach towards the reduction of pollution for pharmaceutical and dye industries.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3160514 Date:15-12-2022

Subject Name:Green Technology and sustainable Development

Time:02:30 PM TO 05:00 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)**	Discuss 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 principles of Green Chemistry. Explain any three in detail.	**07**
Q.2	**(a)**	Explain the importance of ultrasonic assistant reactions towards green synthesis.	**03**
	(b)	Explain why using reactions with high atom economy is important for sustainable development.	**04**
	(c)	Explain the concept of green nanotechnology with suitable examples.	**07**
		OR	
	(c)	Describe sustainability challenges and possibilities for major technical systems and for their transformation to meet sustainability requirements.	**07**
Q.3	**(a)**	Discuss the importance of green solvents and give few examples of the same.	**03**
	(b)	Enlist the three principal dimensions of Sustainable Development and explain anyone in detail.	**04**
	(c)	Explain the greener approach towards reduction of pollution for pesticides industries.	**07**
		OR	
Q.3	**(a)**	Explain the importance of microwave assistant reactions towards green synthesis.	**03**
	(b)	Define ionic liquid with suitable examples.	**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 barriers and motivators in cleaner production in process industries.	**04**
	(c)	Enlist various cleaner production tools and discuss their working methodology and applications in chemical industries.	**07**

OR

Q.4	**(a)**	Discuss the merits and demerits of cleaner production in process industries.	**03**
	(b)	Explain the environmental management hierarchy.	**04**
	(c)	Describe the cleaner production with due reference to wastewater minimization in Diethyl Malonate production.	**07**
Q.5	**(a)**	Discuss the relation between CP and EMS.	**03**
	(b)	Discuss the company's responsibilities to employ the green emerging technologies for sustainable development.	**04**
	(c)	Illustrate the "Principles of Process Optimization" to achieve Waste Minimization in a plant producing "Vinyl Acetate (VA)" or any other example.	**07**

OR

Q.5	**(a)**	Explain anyone unit operation which can help in producing cleaner product.	**03**
	(b)	Define Green laws compliance with suitable example.	**04**
	(c)	Discuss in detail applications of "Cleaner Production Principles" with special reference to liquid effluent waste minimization for the following industrial products: (i) H-acid & (ii) Paracetamol.	**07**

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