

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER- V EXAMINATION – SUMMER 2026

Subject Code:3150507

Date:21-05-2026

Subject Name:Energy Technology

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 importance of energy conservation in the context of a growing economy.	03
	(b) Analyze the factors affecting the efficiency of solar collectors and suggest ways to improve it.	04
	(c) Develop a comprehensive plan for improving energy efficiency in an industrial steam system, including steam trapping and condensate recovery.	07
Q.2	(a) Describe the principle of combustion and its relevance to energy efficiency in thermal utilities.	03
	(b) Discuss the role of calorific values in evaluating fuel efficiency for thermal utilities.	04
	(c) Create a proposal for a community-based biogas plant, including design considerations, expected energy output, and environmental benefits.	07
	OR	
	(c) Explain the principles of waste heat recovery in industrial systems. Discuss various commercially viable waste heat recovery devices and their saving potential.	07
Q.3	(a) Outline the basic principle behind wind energy conversion systems.	03
	(b) Evaluate the impact of wind speed variations on the power output of wind turbines.	04
	(c) Evaluate the impact of energy sector reforms on national energy security and propose further improvements.	07
	OR	
Q.3	(a) What are the advantages of using insulation in thermal utilities, and how does it contribute to energy savings?	03
	(b) Compare and contrast the energy saving potential of steam system optimizations versus waste heat recovery.	04
	(c) Propose a design for a wind farm, including turbine selection, site analysis, and expected power generation.	07
Q.4	(a) Describe the basic operation of a hydrogen-oxygen fuel cell.	03
	(b) Assess the advantages and limitations of ion exchange membrane cells in fuel cell technology.	04
	(c) Analyze the potential for energy savings in an industrial fuel combustion system by integrating advanced insulation materials.	07
	OR	
Q.4	(a) Explain the role of photosynthesis in biomass energy conversion technology.	03

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| | (b) | Design a simple energy audit checklist for a small manufacturing plant focusing on thermal utilities. | 04 |
| | (c) | Design a fuel cell-based power system for a remote location, detailing the type of fuel cell, energy storage, and distribution strategy. | 07 |
| Q.5 | (a) | Identify and describe one major advantage of molten carbonate fuel cells over traditional hydrogen-oxygen fuel cells. | 03 |
| | (b) | Analyze the environmental benefits of converting biomass to energy versus traditional fossil fuels. | 04 |
| | (c) | Develop a comprehensive energy management strategy for a university campus, incorporating solar, biomass, and energy efficiency measures. | 07 |
| | | OR | |
| Q.5 | (a) | List and briefly describe three types of biogas plants. | 03 |
| | (b) | Suggest improvements for a solar pond system to enhance its energy storage capabilities. | 04 |
| | (c) | Create an innovative solution that combines solar energy storage with electric vehicle charging stations. Detail the technology and feasibility. | 07 |
