

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 |

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V EXAMINATION – SUMMER 2025****Subject Code:3150507****Date:13-05-2025****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) Describe the use of non-conventional energy resources in the chemical industries.	03
	(b) Elaborate on the terms Renewable and Non-renewable Energy	04
	(c) Classify different types of solar collectors and explain any one in detail.	07
Q.2	(a) List major constituents of LPG and Natural gas.	03
	(b) Explain the 3 T's of combustion.	04
	(c) Classify commercial waste heat recovery devices (WHRD) and Explain any one commercial waste heat recovery device.	07
	OR	
	(c) Explain the proximate and ultimate analysis of coal in detail.	07
Q.3	(a) Define : (i) Solar constant (ii) Beam radiation (iii) Diffuse radiation	03
	(b) Explain in brief about Solar pumping.	04
	(c) Explain various solar energy storage systems.	07
	OR	
Q.3	(a) List various domestic and industrial applications of solar energy.	03
	(b) Explain in brief about Solar distillation.	04
	(c) Describe the principle of solar photovoltaic conversion and application.	07
Q.4	(a) List contributing factors that affect biogas generation.	03
	(b) Explain Combustion of biomass.	04
	(c) Describe Ion exchange membrane cell with neat diagram.	07
	OR	
Q.4	(a) Classify fuel cells.	03
	(b) Differentiate fuel cell and battery.	04
	(c) List out the classification of biogas plants and explain the working of anyone with a neat sketch.	07
Q.5	(a) Compare Horizontal axis wind turbine and vertical axis wind turbine.	03
	(b) Describe the main considerations in selecting a site for wind generators.	04
	(c) Describe with a neat sketch the working of a wind energy system with main components.	07
	OR	
Q.5	(a) Classify various types of rotor used in the wind turbine.	03
	(b) Classify biogas plants based on process and design.	04
	(c) Describe the basic working principle of a wind energy conversion system.	07

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2024****Subject Code: 3150507****Date: 16-05-2024****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) Describe the importance of energy conservation.	03
	(b) Elaborate on the terms energy management & energy audit.	04
	(c) Explain in detail the construction of solar cells, solar modules and solar arrays.	07
Q.2	(a) List different types of steam used in processes.	03
	(b) Differentiate Gross calorific value and Net calorific value.	04
	(c) Classify commercial waste heat recovery devices (WHRD) and Explain any one commercial waste heat recovery device.	07
	OR	
Q.3	(c) Explain the selection criteria of refractories along with their applications.	07
	(a) Define : (i) Solar constant (ii) Beam radiation (iii) Diffuse radiation	03
	(b) Explain in brief about Solar distillation	04
	(c) Describe the principle of operation and working of solar ponds.	07
	OR	
Q.3	(a) List various domestic and industrial applications of solar energy.	03
	(b) Explain in brief about Solar pumping.	04
	(c) Classify different types of solar collectors and explain any one in detail.	07
Q.4	(a) State the principle and working of the fuel cell.	03
	(b) Explain pyrolysis of biomass	04
	(c) Describe Molten Carbonate Fuel Cell (MCFC) with neat diagram.	07
	OR	
Q.4	(a) List applications of fuel cell.	03
	(b) List properties of biogas and explain the utilization of biogas.	04
	(c) Describe Ion exchange membrane cell with neat diagram.	07
Q.5	(a) Compare Horizontal axis wind turbine and vertical axis wind turbine.	03
	(b) Discuss thermal gasification of biomass.	04
	(c) Describe with a neat sketch the working of a wind energy system with main components.	07
	OR	
Q.5	(a) Classify various types of rotor used in the wind turbine.	03
	(b) Classify biogas plants based on process and design.	04
	(c) Describe how the design of the turbine effect power generation from wind.	07

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- V EXAMINATION-SUMMER 2023****Subject Code: 3150507****Date: 23/06/2023****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) Discuss world energy futures.	03
	(b) Enlist the application of fuel cells.	04
	(c) Define solar collector. List various types of line-focusing type concentrators and explain one of them.	07
Q.2	(a) What is the importance of energy conservation and energy audit?	03
	(b) Discuss the properties of biogas.	04
	(c) Why coal preparation is required? Also, explain in detail the steps which are involved to prepare the coal.	07
	OR	
	(c) Discuss in detail the gasification of coal.	07
Q.3	(a) Draw a neat sketch of a wind energy conservation system (WECS) with all components.	03
	(b) Define the terms (I) Solar constant, (II) Concentration ratio, (III) Declination angle, (IV) Angle of Incidence.	04
	(c) Explain the different dry processes for biomass conversion.	07
	OR	
Q.3	(a) What is the nature of wind?	03
	(b) Enlist various applications of solar energy.	04
	(c) Short note: Types of biogas plant	07
Q.4	(a) Explain energy management with different steps.	03
	(b) Explain the power of wind for power generation.	04
	(c) Explain the ion exchange membrane cell with a neat figure.	07
	OR	
Q.4	(a) List out conventional and non-conventional energy resources.	03
	(b) Explain the advantages and disadvantages of wind energy.	04
	(c) Describe Molten Carbonate Fuel Cell (MCFC) with a neat diagram	07
Q.5	(a) List out the disadvantages of the fuel cell.	03
	(b) Explain the pressure and velocity curves of wind passing through a horizontal axis wind turbine.	04
	(c) Enlist all commercially viable waste heat recovery devices and discuss anyone in detail.	07
	OR	
Q.5	(a) Short note on polarization in a fuel cell.	03
	(b) List considerations for site selection of wind energy.	04
	(c) List refractory applications and explain their role in the selection for Energy saving.	07