

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:3150507****Date:22/01/2021****Subject Name:Energy Technology****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		<b>MARKS</b>
<b>Q.1</b>	(a) Differentiate between conventional & non-conventional Energy sources.	<b>03</b>
	(b) Discuss on world energy futures.	<b>04</b>
	(c) List out all the commercially available waste heat recovery devices. Explain any one device with neat sketch.	<b>07</b>
<b>Q.2</b>	(a) Discuss selection and applications of refractories.	<b>03</b>
	(b) Explain types of Energy Audit.	<b>04</b>
	(c) Explain proximate and ultimate analysis of coal in detail.	<b>07</b>
<b>Q.3</b>	(a) Define steam traps. State the functions of steam traps.	<b>03</b>
	(b) Explain types of insulations and also discuss its applications.	<b>04</b>
	(c) Discuss in detail about energy conservation. Also state its importance.	<b>07</b>
<b>Q.4</b>	(a) Define: (i) Beam Radiation, (ii) Solar Altitude, (iii) Solar Azimuth Angle	<b>03</b>
	(b) What are the advantages and disadvantages of fuel cell?	<b>04</b>
	(c) Explain solar pond briefly. What are the applications of solar pond?	<b>07</b>
<b>Q.5</b>	(a) List all the factors affecting biodigestion.	<b>03</b>
	(b) What are the advantages and disadvantages of concentrating collectors over flat plate collectors?	<b>04</b>
	(c) Categorize different types of fuel cell and describe Molten Carbonate Fuel Cell (MCFC) with neat diagram.	<b>07</b>
<b>Q.6</b>	(a) Define Photosynthesis. What are the conditions necessary for photosynthesis?	<b>03</b>
	(b) Define biomass and list biomass energy resources.	<b>04</b>
	(c) List out various types of instruments for measuring solar radiation and explain any one.	<b>07</b>
<b>Q.7</b>	(a) What are the techniques suggested for maintaining the biogas production?	<b>03</b>
	(b) Enlist various applications of solar energy.	<b>04</b>
	(c) Describe with neat sketch the working of a wind energy system (WECS) with main components.	<b>07</b>
<b>Q.8</b>	(a) State different applications of wind energy.	<b>03</b>
	(b) Describe the main considerations in selecting a site for wind generators.	<b>04</b>
	(c) Describe construction and working of KVIC digester.	<b>07</b>

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2021****Subject Code:3150507****Date:15/12/2021****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.

- Q.1** (a) Enlist the advantages and limitations of non-conventional energy sources. **03**  
(b) Explain solar pond in brief. **04**  
(c) Explain proximate and ultimate analysis of coal in detail. **07**

- Q.2** (a) Discuss in brief about criteria for site selection of wind mill. **03**  
(b) Discuss in brief: Factors affecting the biogas generation **04**  
(c) Define Fuel Cell. Explain in details about ion exchange membrane cell with neat diagram. **07**

**OR**

- (c) Discuss in brief about the type of electrodes for fuel cell and state various applications of fuel cell technology. **07**
- Q.3** (a) Explain in brief about the thermal storage system of solar energy. **03**  
(b) Explain in brief: Steam trapping **04**  
(c) Define conventional & non conventional energy source. Explain in brief about conventional & non conventional energy sources with reference to Indian context. **07**

**OR**

- Q.3** (a) Discuss in brief about energy audit. **03**  
(b) Explain in brief: Selection and application of refractories. **04**  
(c) Define solar collector. List various types of line focusing type concentrator and explain one of it. **07**
- Q.4** (a) Discuss advantages and disadvantages of fuel cell in brief. **03**  
(b) Explain in brief: Thermal gasification of biomass **04**  
(c) Explain in details with neat sketch about the working of a wind energy conservation system (WECS) with main components. **07**

**OR**

- Q.4** (a) Enlist various applications of wind energy. **03**  
(b) Explain in brief: Polarization in fuel cell **04**  
(c) Enlist Indian types of biogas plant and explain any one in details. **07**
- Q.5** (a) Discuss in brief: various application of solar collectors. **03**  
(b) Discuss in brief about energy conservation and its importance. **04**  
(c) Enlist commercially viable waste heat recovery devices and discuss any one of the device in details. **07**

**OR**

- Q.5** (a) Discuss in brief about importance of site selection for installation of biogas plant. **03**  
(b) Discuss in brief: Advantages and disadvantages of wind energy **04**  
(c) Enlist various fuel cells. Explain in detail about hydrogen-oxygen fuel cell with neat diagram. **07**

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2021****Subject Code:3150507****Date:07/09/2021****Subject Name:Energy Technology****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.

		<b>MARKS</b>
<b>Q.1</b>	(a) Define Energy Management and describe different steps involved in it.	<b>03</b>
	(b) Why the energy Conservation and energy Audit are necessary? Explain with any example.	<b>04</b>
	(c) Explain any one commercial Waste Heat Recovery Devices with neat figure.	<b>07</b>
<b>Q.2</b>	(a) What is the nature of wind?	<b>03</b>
	(b) Draw the neat sketches of porous absorber type air heaters.	<b>04</b>
	(c) List out different types of fuel cell and explain fossil fuel cell in detail.	<b>07</b>
	<b>OR</b>	
	(c) Explain ion exchange membrane cell with neat figure.	<b>07</b>
<b>Q.3</b>	(a) Discuss energy sector reforms in detail.	<b>03</b>
	(b) Define: (I) Solar constant, (II) Concentration ratio, (III) Declination angle, (IV) Angle of Incidence.	<b>04</b>
	(c) Describe flat plate collector with neat figure also write its advantages.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Discuss classification of Refractories in detail.	<b>03</b>
	(b) Write a short note on Gasification.	<b>04</b>
	(c) Describe any two concentrating type collectors in detail.	<b>07</b>
<b>Q.4</b>	(a) List out the different type of electrodes in detail.	<b>03</b>
	(b) What are the benefits of insulation other than heat loss / heat gain?	<b>04</b>
	(c) Explain the different dry processes for biomass conversion.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Draw the Steam Phase Diagram.	<b>03</b>
	(b) Explain curves of pressure and velocity of wind passing through a propeller of horizontal axis wind turbine.	<b>04</b>
	(c) Discuss factors affecting biogas generation.	<b>07</b>
<b>Q.5</b>	(a) Discuss site selection for a biogas plant.	<b>03</b>
	(b) Write a short note on conversion efficiency in fuel cell.	<b>04</b>
	(c) Discuss the different forces on the blades of turbine and also derive the formula.	<b>07</b>

**OR**

- Q.5** (a) Discuss the benefits of Waste Heat Recovery. **03**  
(b) Derive the formula to calculate power in wind. **04**  
(c) A horizontal shaft, propeller type wind turbine is located in area **07**  
having following wind characteristics: speed of wind 10 m/s at 1  
atm and 15 C.  
Calculate the following:  
1. Air density  
2. Total power density in wind stream,  $\text{W/m}^2$   
3. Maximum possible obtainable power density,  $\text{W/m}^2$   
4. Actual obtainable power density,  $\text{W/m}^2$   
5. Total Power from a wind-turbine of 120 m diameter.  
6. Torque and axial Thrust on the wind-turbine operating at 40  
rpm and at maximum efficiency of 42 %.

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V(NEW) EXAMINATION – SUMMER 2022****Subject Code:3150507****Date:02/06/2022****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**

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|------------|--|-----------|
| <b>Q.1</b> | (a) What is a solar pond?  | <b>03</b> |
|            | (b) Explain site selection criteria for wind power generation.   | <b>04</b> |
|            | (c) Discuss the type of solar collector and its advantages.  | <b>07</b> |
| <b>Q.2</b> | (a) Explain energy audit.  | <b>03</b> |
|            | (b) Discuss energy demand.   | <b>04</b> |
|            | (c) List refractory applications and explain their role in selection for energy saving.                  | <b>07</b> |
| <b>OR</b>  |  |           |
|            | (c) Explain the importance of a flash recovery system with its principle, operation, and advantages.     | <b>07</b> |
| <b>Q.3</b> | (a) Explain the power of wind for power generation.  | <b>03</b> |
|            | (b) Discuss community biogas plant.  | <b>04</b> |
|            | (c) List the advantages and disadvantages of the fuel cell. Explain hydrogen-oxygen fuel cells.          | <b>07</b> |
| <b>OR</b>  |  |           |
| <b>Q.3</b> | (a) Explain wind force's impact on blades and turbines in power generation.                              | <b>03</b> |
|            | (b) Discuss the properties of biogas.  | <b>04</b> |
|            | (c) Explain in detail the molten carbonate cell with its applications.                                   | <b>07</b> |
| <b>Q.4</b> | (a) What is biomass conversion technology?   | <b>03</b> |
|            | (b) Discuss the components of the wind energy conservation system.                                       | <b>04</b> |
|            | (c) List commercially available energy recovery units and explain to anyone with a diagram.              | <b>07</b> |
| <b>OR</b>  |  |           |
| <b>Q.4</b> | (a) Explain pyrolysis of biomass.  | <b>03</b> |
|            | (b) List application of wind energy.   | <b>04</b> |
|            | (c) Discuss with the sketch stepwise coal gasification.  | <b>07</b> |
| <b>Q.5</b> | (a) List out non-conventional energy resources.  | <b>03</b> |
|            | (b) Discuss the type of biogas plant.  | <b>04</b> |
|            | (c) Explain the type of electrodes used in fuel cells and their conversion efficiency for energy output. | <b>07</b> |
| <b>OR</b>  |  |           |
| <b>Q.5</b> | (a) Explain the importance of energy conservation.   | <b>03</b> |
|            | (b) Justify the importance of pH in the generation of biogas.  | <b>04</b> |
|            | (c) Discuss ion exchange membrane cell and fossil fuel cell.   | <b>07</b> |

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