

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-5 SEMESTER – OLD PAPER – W22 TO S25 – QUESTION BANK

Subject Name & Code:

Energy Technology- 3150507

Unit 1: An Introduction to Energy Sources

Repeated Questions:

1. **Differentiate between Conventional and Non-conventional energy resources.**
 - (W 2022 - 04 Marks) (S 2023 - 04 Marks in Q.4(a))
2. **Differentiate between Primary and Secondary energy resources.**
 - (W 2022 - 04 Marks) (W 2024 - 04 Marks in Q.1(b))
3. **Define Energy Audit and explain its importance.**
 - (W 2022 - 03 Marks in Q.2(a)) (W 2023 - 04 Marks in Q.5(b)) (W 2024 - 04 Marks in Q.5(b))
4. **Define Energy Security.**
 - (W 2022 - 03 Marks in Q.2(a)) (W 2024 - 03 Marks in Q.1(a))
5. **Write a short note on World Energy Future / Energy Consumption and world energy future.**
 - (W 2022 - 03 Marks in Q.1(a)) (W 2023 - 03 Marks in Q.5(a)) (S 2023 - 03 Marks in Q.1(a))

Other Important Questions:

6. **Discuss the importance of Energy Conservation.**
 - (S 2024 - 03 Marks) (W 2022 - 04 Marks in Q.4(b))
7. **Elaborate on the terms Energy Management & Energy Audit.**
 - (S 2024 - 04 Marks) (S 2023 - 04 Marks in Q.4(a))
8. **Describe the use of non-conventional energy resources in the chemical industries.**
 - (S 2025 - 03 Marks)
9. **Elaborate on the terms Renewable and Non-renewable Energy.**
 - (S 2025 - 04 Marks)
10. **Explain the impact of energy consumption on the environment and how energy conservation helps mitigate these impacts.**
 - (W 2024 - 07 Marks in Q.5(c))
11. **Discuss energy needs for a growing economy and why energy security is important.**
 - (Related to W 2024 - 03 Marks in Q.1(a))

Unit 2: Energy Efficiency in Thermal Utilities

Repeated Questions:

1. **Explain Proximate and Ultimate Analysis of coal.**
 - (W 2022 - 03 Marks in Q.3(a)) (W 2024 - 04 Marks in Q.2(b)) (S 2025 - 07 Marks in Q.2(c))
2. **Define Calorific Value. Differentiate between Gross and Net Calorific Value.**
 - (W 2022 - 03 Marks in Q.3(a)) (W 2024 - 03 Marks in Q.2(a)) (S 2024 - 04 Marks in Q.2(b))
3. **Discuss commercially viable Waste Heat Recovery Devices (WHRD). / Classify WHRD and explain any one.**
 - (W 2022 - 04 Marks in Q.2(b)) (S 2023 - 07 Marks in Q.5(c)) (S 2024 - 07 Marks in Q.2(c)) (S 2025 - 07 Marks in Q.2(c))
4. **Explain the types and applications of Insulation and Refractories.**
 - (W 2022 - 04 Marks in Q.3(b)) (S 2023 - 07 Marks in Q.5(c)) (S 2024 - 07 Marks in Q.2(c) - OR part)

Other Important Questions:

5. **Explain the process of coal gasification with a neat sketch.**
 - (W 2024 - 07 Marks in Q.1(c))
6. **Explain the principle of combustion and factors affecting combustion efficiency. / Explain the 3 T's of combustion.**
 - (W 2024 - 07 Marks in Q.2(c) - OR part) (S 2025 - 04 Marks in Q.2(b))
7. **Explain the steps involved in identifying energy-saving opportunities in a steam distribution system.**
 - (W 2024 - 07 Marks in Q.2(c))
8. **What is the role of a steam trap? / Name two functions of a steam trap.**
 - (W 2024 - 03 Marks in Q.4(a)) (W 2023 - 03 Marks in Q.3(a) - OR part)
9. **Why is coal preparation required? Explain the steps involved.**
 - (S 2023 - 07 Marks in Q.2(c))
10. **List major constituents of LPG and Natural gas.**
 - (S 2025 - 03 Marks in Q.2(a))
11. **Explain the concept of 'economic thickness of insulation'.**
 - (W 2024 - 04 Marks in Q.5(b))

Unit 3: Solar Energy

Repeated Questions:

1. **Classify and explain different types of solar collectors. / Compare flat plate and concentrating collectors.**
 - (W 2022 - 07 Marks in Q.2(c)) (W 2024 - 04 Marks in Q.3(b)) (S 2024 - 07 Marks in Q.3(c) - OR part) (S 2025 - 07 Marks in Q.1(c))
2. **Explain various applications of solar energy.**
 - (W 2022 - 07 Marks in Q.2(c)) (S 2023 - 04 Marks in Q.3(b)) (S 2024 - 03 Marks in Q.3(a) - OR part) (S 2025 - 03 Marks in Q.3(a) - OR part)
3. **Describe solar energy storage systems.**
 - (W 2022 - 07 Marks in Q.3(c)) (S 2025 - 07 Marks in Q.3(c))
4. **Define: (i) Solar constant (ii) Beam radiation (iii) Diffuse radiation.**
 - (W 2022 - 03 Marks in Q.5(a)) (S 2024 - 03 Marks in Q.3(a)) (S 2025 - 03 Marks in Q.3(a))

Other Important Questions:

5. **Describe the principle and working of a solar pond.**
 - (W 2022 - 07 Marks in Q.2(c) - OR part) (S 2024 - 07 Marks in Q.3(c))
6. **Describe the construction and working of a flat plate collector with a neat sketch.**
 - (W 2022 - 07 Marks in Q.1(c))
7. **Explain Solar Photovoltaic conversion, construction of solar cells, modules, and arrays.**
 - (S 2024 - 07 Marks in Q.1(c)) (S 2025 - 07 Marks in Q.3(c) - OR part)
8. **Write short notes on: Solar Distillation / Solar Pumping.**
 - (S 2024 - 04 Marks in Q.3(b)) (S 2025 - 04 Marks in Q.3(b) - OR part) (S 2025 - 04 Marks in Q.3(b))
9. **Define: Solar Altitude, Solar Azimuth Angle, Declination Angle, Angle of Incidence.**
 - (W 2022 - 03 Marks in Q.5(a)) (S 2023 - 04 Marks in Q.3(b))
10. **Explain any one type of solar refrigeration/water heating system.**
 - (W 2023 - 07 Marks in Q.3(c)) (W 2023 - 07 Marks in Q.4(c) - OR part)

Unit 4: Fuel Cell

Repeated Questions:

1. **Describe the working of a Hydrogen-Oxygen / Ion Exchange Membrane Fuel Cell with a neat diagram.**
 - (W 2024 - 07 Marks in Q.4(c)) (S 2024 - 07 Marks in Q.4(c) - OR part) (S 2025 - 07 Marks in Q.4(c))
2. **Describe the working of a Molten Carbonate Fuel Cell (MCFC) with a neat diagram.**
 - (W 2022 - 07 Marks in Q.5(c)) (S 2023 - 07 Marks in Q.4(c)) (S 2024 - 07 Marks in Q.4(c))
3. **List the advantages, disadvantages, and applications of fuel cells.**
 - (W 2022 - 04 & 07 Marks in Q.3(b & c)) (S 2023 - 07 Marks in Q.4(c)) (S 2024 - 03 Marks in Q.4(a) - OR part)
4. **Define Polarization in fuel cells and its significance. / Write a short note on conversion efficiency & polarization.**
 - (W 2024 - 03 Marks in Q.4(a)) (W 2023 - 07 Marks in Q.5(c)) (S 2023 - 07 Marks in Q.5(a))

Other Important Questions:

5. **Classify different types of fuel cells.**
 - (W 2022 - 03 Marks in Q.3(a) - OR part) (S 2025 - 03 Marks in Q.4(a))
6. **Differentiate between a fuel cell and a battery.**
 - (S 2025 - 04 Marks in Q.4(b))
7. **Explain the types of electrodes used in fuel cells.**
 - (W 2024 - 07 Marks in Q.5(c)) (W 2023 - 04 Marks in Q.3(b))
8. **List the desired properties of an ideal ion exchange membrane electrolyte.**
 - (W 2023 - 03 Marks in Q.5(a))

Unit 5: Energy from Biomass

Repeated Questions:

1. **Explain the factors affecting biogas generation.**
 - (W 2022 - 03 Marks in Q.4(a)) (S 2025 - 03 Marks in Q.4(a))
2. **Write a short note on the types of biogas plants. / Classify biogas plants based on process and design and explain any one.**
 - (W 2022 - 07 Marks in Q.4(c)) (S 2023 - 07 Marks in Q.3(c) - OR part) (S 2025 - 04 & 07 Marks in Q.5(b) & Q.4(c))
3. **Explain Pyrolysis / Thermal gasification of biomass.**
 - (W 2022 - 03 Marks in Q.4(a) - OR part) (W 2023 - 03 Marks in Q.1(c)) (S 2024 - 04 Marks in Q.4(b)) (S 2025 - 04 Marks in Q.5(b))

Other Important Questions:

4. **Describe the design and working principle of a community biogas plant. / Draw the flowsheet of a community plant.**
 - (W 2024 - 07 Marks in Q.3(c)) (W 2023 - 04 Marks in Q.4(b))
5. **Discuss the properties and utilization of biogas.**
 - (S 2023 - 04 Marks in Q.2(b)) (S 2024 - 04 Marks in Q.4(b) - OR part)
6. **Describe the construction and working of a KVIC digester.**
 - (W 2022 - 07 Marks in Q.5(c))
7. **Define Photosynthesis.**
 - (W 2022 - 03 Marks in Q.5(a) - OR part)

Unit 6: Wind Energy

Repeated Questions:

1. **Describe with a neat sketch the working of a Wind Energy Conversion System (WECS) with its main components.**
 - (S 2023 - 07 Marks in Q.3(a)) (S 2024 - 07 Marks in Q.5(c)) (S 2025 - 07 Marks in Q.5(c))
2. **Explain the basic principles of wind energy and the factors affecting site selection for wind generators.**
 - (W 2024 - 07 Marks in Q.4(c) - OR part) (S 2023 - 04 Marks in Q.4(b)) (S 2025 - 04 Marks in Q.5(b))
3. **Compare Horizontal Axis and Vertical Axis Wind Turbines.**
 - (S 2024 - 03 Marks in Q.5(a)) (S 2025 - 03 Marks in Q.5(a))
4. **Classify Wind Energy Conservation Systems (WECS).**
 - (W 2023 - 04 Marks in Q.4(a)) (S 2023 - 04 Marks in Q.4(a))

Other Important Questions:

5. **Explain the power in the wind for power generation. / Derive the formula for Betz Limit (Coefficient).**
 - (W 2023 - 07 Marks in Q.3(c)) (S 2023 - 07 Marks in Q.4(b)) [*Numerical Derivation*]
6. **Classify various types of rotors used in wind turbines.**
 - (S 2024 - 03 Marks in Q.5(a) - OR part) (S 2025 - 03 Marks in Q.5(a) - OR part)
7. **Explain the advantages and disadvantages of wind energy.**
 - (S 2023 - 04 Marks in Q.4(b))
8. **List applications of wind energy.**
 - (W 2022 - 07 Marks in Q.4(c) - OR part)
