

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK

Subject Name & Code:

ENERGY CONSERVATION (3160916)

Unit 1: Energy Audit Methodology and Recent Trends

Repeated Questions:

1. **Explain/Write down guidelines for writing energy audit report.**
 - (S25 - Q1c, 07 marks)
 - (W25 - Q1a, 03 marks)
 - (S24 - Q1c, 07 marks)
 - (S23 - Q1c, 07 marks)
 - (W24 - Q2 OR, 07 marks)
 - (W23 - Q1b, 04 marks)
 - (W22 - Q1c, 07 marks) [*Covers same topic but phrased as "Discuss Economics..."*]
2. **Define/Explain the general principles of energy management.**
 - (S25 - Q1b, 04 marks)
 - (W25 - Q1b, 04 marks)
 - (S24 - Q1b, 04 marks)
 - (S23 - Q1a, 04 marks)
 - (W24 - Q1c, 07 marks) [*Includes skills*]
 - (W23 - Q1a, 03 marks)
 - (W22 - Q1b, 04 marks)
3. **What is the importance of energy audit?**
 - (S25 - Q1a, 03 marks)
 - (W24 - Q1b, 04 marks)
 - (S24 - Q1a, 03 marks)
 - (S23 - Q1a, 03 marks)
 - (W22 - Q1a, 03 marks)
4. **Explain various instruments used for performing energy audit / for audit and monitoring energy and energy savings.**
 - (S25 - Q4 OR, 07 marks)
 - (S24 - Q1c, 07 marks)
 - (S23 - Q1c, 07 marks)
 - (W24 - Q2b, 04 marks)
 - (W23 - Q1c, 07 marks)

Other Important Questions (Newest to Oldest):

- **Economics of implementation of energy optimization projects, its constraints, barriers and limitations.** (S22 - Q1c, 07 marks)
- **Discuss Case studies of implemented energy cost optimization projects in electrical utilities as well as thermal utilities.** (S22 - Q2 OR, 07 marks)
- **Explain need of energy audit and management.** (W22 - Q1a, 03 marks)
- **Define energy management. Write down its objective.** (W22 - Q1b, 04 marks)
- **Explain energy management strategy.** (W22 - Q1c, 07 marks)
- **What is energy audit? Explain elements of energy audit.** (S24 - Q1a, 03 marks)
- **Classify energy audit & explain the three phases of detailed audit.** (W23 - Q1b, 04 marks)
- **Define the following: i) Payback period ii) ROI iii) NPV iv) IRR** (S24 - Q1b, 04 marks)
- **Compare preliminary audit and detailed audit.** (S23 - Q1b, 04 marks)

- **Explain importance of energy conservation and role of standards and labelling in it.** (S23 - Q1a, 04 marks)
 - **Explain need of energy audit and management.** (W22 - Q1a, 03 marks)
 - **What do mean of Energy Management Skills?** (S22 - Q2a, 03 marks)
 - **Explain the meaning of energy management skills.** (W24 - Q2a, 03 marks)
 - **Explain skills required for Energy Manager.** (S23 - Q3 OR a, 03 marks)
 - **List out the instruments for audit & monitoring energy & energy savings.** (S22 - Q2b, 04 marks)
 - **Explain limitations of energy optimization projects.** (S23 - Q3a, 04 marks)
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Unit 2: Electrical Distribution and Utilization

Repeated Questions:

1. **Explain/Discuss Demand Side Management (DSM).**
 - (S25 - Q4a, 03 marks)
 - (S24 - Q3a, 07 marks)
 - (S23 - Q2 OR c, 07 marks) [*Technical note*]
 - (W24 - Q2c, 07 marks)
 - (W23 - Q5b, 04 marks)
 - (W22 - Q3a, 03 marks)
2. **Explain the effects of harmonics and improvement methods / reduction techniques.**
 - (S25 - Q2b, 04 marks)
 - (W25 - Q2 OR c, 07 marks)
 - (S24 - Q3a, 03 marks)
 - (W24 - Q3 OR c, 07 marks)
 - (W23 - Q2b, 04 marks)
3. **State/Enlist disadvantages of low power factor. Discuss/Explain methods of power factor improvement.**
 - (W25 - Q2c, 07 marks)
 - (W23 - Q2 OR c, 07 marks)
 - (S22 - Q4a, 03 marks)
4. **Explain methods to reduce / List out methods of reduction of transformer losses.**
 - (S25 - Q2b, 04 marks)
 - (S23 - Q2b, 04 marks)
 - (S22 - Q3b, 04 marks)
 - (W25 - Q5a, 03 marks)
5. **What are the main causes for T & D losses? / Explain methods to reduce T&D losses.**
 - (S25 - Q4b, 04 marks)
 - (W24 - Q1a, 03 marks)
 - (S23 - Q3b, 04 marks)

Other Important Questions (Newest to Oldest):

- **Define Harmonics and explain causes of it.** (S23 - Q2a, 03 marks)
- **Explain role of Bureau of Energy Efficiency (BEE).** (S24 - Q2a, 03 marks)
- **Write importance of parallel operations in power system.** (S22 - Q3a, 03 marks)
- **State advantages of parallel operation of transformer.** (S24 - Q2c, 07 marks)
- **Write importance of parallel operation of transformers.** (W24 - Q3 OR a, 03 marks)
- **Explain the effect of low power system on electrical systems.** (W24 - Q3 OR b, 04 marks)
- **Explain power factor improvement using: i) Static Capacitors ii) Synchronous Condenser** (S24 - Q2 OR e, 07 marks)
- **Write a short note on automatic power factor controllers.** (W23 - Q2c, 07 marks)
- **Define Automatic power factor Controllers.** (S22 - Q4b, 04 marks)
- **What is automatic power controller? Explain in details.** (S25 - Q5a, 03 marks)
- **What do you mean by Load Management?** (S22 - Q3b, 04 marks)
- **Define T & D losses.** (S22 - Q3 OR a, 03 marks)
- **Discuss Case Studies related to Power factor improvement in detail.** (S22 - Q4 OR c, 07 marks)
- **Explain advantages of soft starter over conventional starters.** (S24 - Q3b, 04 marks)
- **What is significant of soft starter? How it is saving energy?** (S25 - Q5 OR c, 07 marks)
- **State advantages and application of soft starters.** (W25 - Q5 OR a, 03 marks)
- **Write a short note on soft starter.** (W22 - Q3 OR c, 07 marks)
- **Explain need of starters both for a.c & d.c motors.** (W24 - Q3a, 03 marks)
- **Explain Variable Speed Drive (VSD) / variable frequency drive.** (S24 - Q3 OR c, 07 marks) & (S25 - Q4 OR c, 07 marks)
- **Explain variable speed drivers.** (W22 - Q3b, 04 marks)

- **Write a technical note on: Variable Speed Drive (VSD).** (S24 - Q3 OR c, 07 marks)
 - **Describe technical aspects of energy efficient motors and energy saving by it.** (W23 - Q2c, 07 marks)
 - **State and explain characteristics of energy efficient motors.** (S24 - Q3c, 07 marks)
 - **What are the characteristics of energy efficient motors? Explain in details.** (S25 - Q5 OR b, 04 marks)
 - **Write a short note on "Energy efficient Motors".** (S22 - Q3 OR c, 07 marks)
 - **What is energy efficient motor? How is it important?** (W22 - Q3a, 03 marks)
 - **List advantages of electronic ballast.** (S24 - Q3 OR a, 03 marks)
 - **Explain energy conservation in commercial lighting system.** (S23 - Q2c, 07 marks)
 - **Explain the procedure to save the energy of a lighting system.** (S25 - Q4 OR b, 04 marks)
 - **Discuss energy saving in lighting system.** (W25 - Q2b, 04 marks)
 - **Explain steps for energy saving in any residential application.** (S24 - Q3 OR b, 04 marks)
 - **Explain various methods of energy conservation in house.** (S25 - Q5 OR a, 03 marks)
 - **Describe energy saving using LED, soft starter and variable speed drive.** (W23 - Q5c, 07 marks)
 - **Write advantages & disadvantages of L.E.D.** (W24 - Q4 OR b, 04 marks)
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Unit 3: Thermal Systems (Boilers, Furnaces, Steam, Insulation)

Repeated Questions:

1. **Write difference/Compare between FBC and PFBC boilers.**
 - (S25 - Q3 OR b, 04 marks)
 - (W25 - Q4b, 04 marks)
 - (W22 - Q4b, 04 marks)
2. **What are the Advances in boiler technologies?**
 - (S25 - Q3 OR a, 03 marks)
 - (W25 - Q5b, 04 marks)
 - (S22 - Q4 OR b, 04 marks)
 - (W24 - Q4b, 04 marks)
3. **Describe Water treatment / Explain feedwater treatment and its impact on boiler losses.**
 - (S25 - Q3 OR b, 04 marks)
 - (S24 - Q4c, 04 marks)
 - (S23 - Q3c, 07 marks)
 - (W25 - Q4 OR c, 07 marks)
 - (S22 - Q4 OR a, 03 marks)
4. **List factors affecting furnace performance.**
 - (W25 - Q4a, 03 marks)
 - (S23 - Q4b, 04 marks)
 - (W23 - Q3c, 07 marks)
5. **Discuss the sources of waste heat and its potential applications.**
 - (W25 - Q4c, 07 marks)
 - (W23 - Q3 OR c, 07 marks)
6. **Write down/Explain properties of steam utilization.**
 - (W25 - Q4 OR b, 04 marks)
 - (W22 - Q4a, 03 marks)

Other Important Questions (Newest to Oldest):

- **Discuss Steam Utilization Properties, distribution and losses & steam trapping.** (W23 - Q5 OR c, 07 marks) & (S22 - Q5a, 07 marks) & (W24 - Q5c, 07 marks)
- **Enlist the classification of furnaces.** (S25 - Q1b, 04 marks)
- **List out the Types and classifications of Furnace.** (S22 - Q5a, 03 marks)
- **Give the types and classification of furnace. Explain any one in detail.** (W22 - Q4 OR c, 07 marks)
- **Describe factors affecting fuel economy in furnaces.** (W23 - Q3c, 07 marks)
- **Explain energy efficiency measures in furnace system.** (S24 - Q4 OR c, 07 marks)
- **Define furnaces refractory- types and sections.** (S22 - Q5b, 04 marks) & (W24 - Q5 OR b, 04 marks)
- **Write advantages and properties of thermal insulating material.** (W25 - Q4 OR a, 03 marks) & (W23 - Q3a, 03 marks)
- **Give the hot and cold applications of insulator.** (W22 - Q2a, 03 marks)
- **What is FBC Boilers?** (S25 - Q3 OR a, 03 marks) & (W24 - Q5a, 03 marks)
- **Explain PFBC boiler.** (S24 - Q4 OR a, 03 marks)
- **Write a technical note on: Atmospheric Fluidized Bed Combustion system (AFBC).** (S23 - Q5b, 04 marks)
- **Discuss heat recovery boilers with it's Limitations and Constraints.** (S22 - Q4 OR c, 07 marks)
- **Discuss heat recovery boilers & write it's limitations & constraints.** (W24 - Q4 OR c, 07 marks)
- **Explain benefits of blowdown in a boiler.** (S23 - Q4a, 03 marks)
- **Explain intermittent blowdown and continuous blowdown in a boiler.** (S24 - Q4c, 07 marks)
- **Compare fire tube boiler and water tube boiler.** (S24 - Q4a, 03 marks)

- **Draw and explain schematic diagram for flow of water, steam and flue gases in a boiler plant.** (S24 - Q4 OR b, 07 marks)
 - **List out essential qualities of a good boiler.** (W24 - Q4 OR a, 03 marks)
 - **Explain methods for performance evaluation in boiler system.** (S23 - Q3 OR c, 07 marks)
 - **What is the thermic fluid heater? Explain its need and application.** (W22 - Q4b, 04 marks)
 - **Write a technical note on: Thermic Fluid Heaters.** (S23 - Q5 OR b, 04 marks)
 - **Give the limitations of heat recovery.** (W22 - Q4a, 03 marks)
 - **Explain Flash steam recovery.** (W22 - Q4 OR c, 07 marks)
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Unit 4: System Audit of Mechanical Utilities (Pumps, Blowers, Compressors, Cooling Towers)

Repeated Questions:

1. **Explain energy conservation opportunities / energy saving in pump and pumping system.**
 - (S25 - Q3c, 07 marks)
 - (W25 - Q3c, 07 marks)
 - (S23 - Q5c, 07 marks)
 - (W22 - Q2 OR c, 07 marks)
2. **Explain performance of pumps in parallel and series operation.**
 - (S25 - Q2c, 07 marks)
 - (W23 - Q4a, 03 marks)
 - (W24 - Q5 OR a, 03 marks)
3. **Explain various methods of energy conservation in compressors / Energy Saving in Compressors & Compressed Air Systems.**
 - (S25 - Q2 OR c, 07 marks)
 - (W25 - Q3 OR c, 07 marks)
 - (S23 - Q5 OR c, 07 marks)
 - (S22 - Q5 OR c, 07 marks)
4. **List out/Types, applications and advantages of blower.**
 - (S25 - Q1a, 03 marks) & (Q3b, 04 marks)
 - (W25 - Q3 OR a, 03 marks)
 - (W23 - Q5 OR b, 04 marks)
 - (S24 - Q5 OR a, 03 marks)
5. **Enumerate/Explain energy saving opportunities in cooling towers.**
 - (S25 - Q5 OR c, 07 marks)
 - (W25 - Q3 OR b, 04 marks)
 - (S23 - Q5 OR a, 03 marks)
6. **Compare reciprocating and rotary air compressor.**
 - (W25 - Q3b, 04 marks)
 - (W23 - Q4a, 03 marks)

Other Important Questions (Newest to Oldest):

- **Explain types of pumps.** (S25 - Q3a, 03 marks)
- **Give the type of pumps and its application.** (W22 - Q5a, 03 marks)
- **List out the Types and application of Pumps.** (S22 - Q5 OR a, 03 marks)
- **What are advantages and disadvantages of compressed air system?** (S24 - Q5a, 03 marks)
- **Explain applications of air compressor.** (S23 - Q5a, 03 marks)
- **Write a technical note on: Series and parallel operations of pumps.** (S23 - Q4c, 07 marks)
- **Explain Head-Discharge characteristics for pumps operated in series and parallel.** (S24 - Q5 OR c, 07 marks)
- **Define Pump. List various applications of pump.** (S23 - Q4 OR a, 03 marks)
- **Explain classification of pumps.** (S23 - Q4 OR b, 04 marks)
- **Explain energy saving in pumps. Also discuss the effect of oversizing the pump.** (S23 - Q5c, 07 marks)
- **Define Energy Saving in Pumps & Pumping Systems.** (S22 - Q5 OR b, 04 marks) & (W24 - Q5b, 04 marks)
- **Describe various methods of energy conservation in blowers.** (S23 - Q5 OR c, 07 marks)
- **Discuss the energy conservation in blower.** (W23 - Q4b, 04 marks)
- **Write short note on energy saving in blowers.** (W24 - Q5 OR c, 07 marks)
- **Give the different series & parallel operation of blower.** (W22 - Q5b, 04 marks)
- **Explain fan efficiency with necessary mathematical equations.** (S24 - Q5 OR b, 04 marks)
- **Describe the methods to improve performance of compressed air system.** (W23 - Q4c, 07 marks)

marks) & (W24 - Q4c, 07 marks)

- **Explain cooling towers.** (W24 - Q4a, 03 marks)
- **Write a short note on cooling tower.** (W22 - Q5c, 07 marks)
- **Enlist the parameters to evaluate the performance of cooling tower.** (S24 - Q5b, 04 marks)
- **Write short notes on water loss in cooling tower.** (S25 - Q3 OR c, 07 marks)
- **Discuss components of Cooling Tower.** (W25 - Q3a, 03 marks)
- **Explain scope of energy saving in steam distribution system.** (S23 - Q4 OR c, 07 marks)

Additional/General Topics (Spanning Multiple Units)

- **Classify heat recovery systems and explain any one in detail.** (W25 - Q5 OR c, 07 marks) & (W23 - Q5a, 03 marks)
- **What is waste heat recovery system? State its advantages and disadvantages.** (S25 - Q5 OR b, 04 marks)
- **State the advantages and limitations of NPV and Payback period.** (W23 - Q5 OR a, 03 marks)
