GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Name & Code:

ENERGY CONSERVATION AND MANAGEMENT- 3161919

Unit 1: Energy Scenario, Energy Conservation Act 2001 and Related Policies

Repeated Questions:

1. **Write short note on / Discuss features of the Energy Conservation Act 2001.** (Appears in 6 papers)
    - Discuss the key features of the Energy Conservation Act 2001 and state its objectives. (W25 - Q2a, 03)
    - Write short note on Energy Conservation Act-2001. (W24 - Q1c, 07)
    - Write short note on Energy Conservation Act-2001. (S23 - Q1c, 07)
    - Discuss in brief Energy Conservation Act-2001 and its features. (W22 - Q1c, 07)
    - Explain the silent features of Energy Conversation Act 2001. (S24 - Q1b, 04)
    - Explain energy conservation Act 2001 and its features, notifications under the Act. (S22 - Q5b, 04)
2. **Enlist / Discuss various schemes of the Bureau of Energy Efficiency (BEE).** (Appears in 5 papers)
    - Enlist various schemes of the Bureau of Energy Efficiency (BEE) and its benefits. (W25 - Q1a, N/A)
    - List out the schemes of BEE. Discuss any two in detail. (S25 - Q1c, 07)
    - Briefly explain various schemes relating to Bureau of Energy Efficiency (BEE) for designated consumers, State designated agencies. (W24 - Q1b, 04)
    - Briefly explain various schemes relating to Bureau of Energy Efficiency (BEE) for designated consumers, State designated agencies. (S22 - Q1b, 04)
    - How BEE help in implementing Energy Conservation Act? (W23 - Q2b, 04)
3. **Discuss the Indian / Sector-wise energy consumption scenario.** (Appears in 4 papers)
    - Discuss the sectorial energy consumption of India and the challenges faced by our country in meeting its energy demands and achieving energy security. (W25 - Q1c, N/A)
    - Discuss sector wise energy consumption scenario in India. (S25 - Q1b, 04)
    - Write note on 'Indian Energy scenario'. (W24 - Q2 OR c, 07)
    - Write short note on Indian Energy scenario. (W23 - Q1c, 07)
4. **Define / Explain Energy Security.** (Appears in 4 papers)
    - Define energy security. Enlist different strategies to achieve it. (W22 - Q1a, 03)
    - What is energy security? Explain how it can be achieved? (S22 - Q2b, 04)
    - Define energy security. Enlist different strategies to achieve it and discuss role of energy conservation to achieve energy security. (S22 - Q1c, 07)
    - Write short note on energy security. (S24 - Q2a, 03)
5. **Define Renewable and Non-Renewable Energy.** (Appears in 3 papers)
    - Differentiate between primary and secondary sources and state examples of each. (W25 - Q1b, N/A)
    - Define i) Renewable Energy ii) Non-Renewable Energy iii) Per Capita energy consumption. (W24 - Q1a, 03)
    - Define i) Renewable Energy ii) Non-Renewable Energy iii) Per Capita energy consumption. (S23 - Q1a, 03)

Other Important Questions (Chronological: Newest to Oldest):

1. Explain long term energy scenario for India. (S24 - Q1c, 07)
2. Explain need of energy sector reforms in India. (S24 - Q2c, 07)
3. Explain: (1) Power factor (2) Energy audit (3) Non-commercial energy. (S25 - Q1a, 03)
4. Define Energy Conservation and explain its importance. (S23 - Q1b, 04)
5. Discuss India's present energy scenario and long-term energy scenario. (W22 - Q1b, 04)
6. Classify energy sources. (W23 - Q1a, 03)
7. What are the features and notifications made under Energy conservation Act 2001? (W23 - Q3a, 03)
8. Define energy pricing. (S24 - Q1a, 03)
9. List four important duties of energy manager in industry as per Energy conservation act-2001. (W22 - Q1c, 07)
10. Discuss the provisions of the Electricity Act 2003 related to energy conservation and analyze the impact of the Electricity Act on the Indian power sector for energy security. (W25 - Q2 OR c, N/A)
11. Define the Energy Conservation Building Code (ECBC) and its significance in promoting energy-efficient building construction. (W25 - Q2c, N/A)
12. Write brief note on ECBC code for Building construction. (S22 - Q4c, 07)
13. Explain the sectorial energy consumption of India and the challenges faced by our country in meeting its energy demands and achieving energy security. (W25 - Q1c, N/A)
14. Define: a) Bench Marking b)ESCOs c) BEE. (S24 - Q3a, 03)

Unit 2: Financial Management, Energy Monitoring and Targeting

Repeated Questions:

1. **Explain / Define Simple Payback Period, Return on Investment (ROI), Net Present Value (NPV), and Internal Rate of Return (IRR).** (Appears in 7 papers)
    - Explain the following terms: Simple payback period, return on investment (ROI), net present value (NPV), and internal rate of return (IRR). (W25 - Q3c, N/A)
    - Explain the terms: Payback period, Cashflow and Return on Investment. (S25 - Q3a, 03)
    - Compare Net Present Value and Internal Rate of Return. (W24 - Q2a, 03)
    - Differentiate between i) Simple payback period and Return on Investment. (S23 - Q2b, 04)
    - Define the terms: Return on Investment, Net Present Value, Internal Rate of Return, Time value of money. (W23 - Q1b, 04)
    - Define the following terms: (i) SPP (ii) Present value of money (iii) ROI (iv) NPV (v) IRR. (W23 - Q2c, 07)
    - Compare Net Present Value and Internal Rate of Return. (S22 - Q2a, 03)
2. **Explain / List benefits of Energy Monitoring and Targeting (M&T).** (Appears in 5 papers)
    - List benefits of Energy Monitoring and Targeting. (W24 - Q2b, 04)
    - List benefits of Energy Monitoring and Targeting. (S23 - Q2a, 03)
    - Explain benefits of energy monitoring and targeting. (S24 - Q3 OR a, 03)
    - What are the benefits of monitoring & targeting system? (W23 - Q3 OR c, 07)
    - Briefly explain essential elements of energy monitoring system. (S24 - Q2b, 04)
3. **Explain the role / concept of Energy Service Companies (ESCOs).** (Appears in 5 papers)
    - Explain the role of energy Service Companies (ESCOs) from the energy conservation point of view. (W25 - Q3 OR a, N/A)
    - What is ESCOs? Discuss the role of ESCOs. (S25 - Q3b, 04)
    - Answer the following questions in term of Energy Servicing Companies (ESCOs). 1) Types of Performance contract offered 2) Role and responsibilities 3) Limitation. (W24 - Q2c, 07)
    - Explain role of the ESCOs in detail. (S23 - Q2 OR c, 07)
    - Discuss the role of Energy Service Companies (ESCOs). (W23 - Q3b, 04)
4. **Explain / Perform CUSUM Analysis.** (Appears in 4 papers)
    - Explain the concept of the cumulative sum of differences (CUSUM) analysis for detecting changes in energy performance. (W25 - Q3b, N/A)
    - The energy production data of an industry follows a relationship... Using CUSUM technique, calculate energy savings... [Full numerical data given]. (S25 - Q3 OR c, 07) [Table given - refer Question paper of Summer 2025].
    - Explain steps involved in CUSUM analysis. (S24 - Q3b, 04)
    - Explain the importance of CUSUM chart and its procedure to analyze the case with help of diagrams. (S22 - Q5 OR c, 07)
5. **Explain Sensitivity Analysis.** (Appears in 4 papers)
    - Explain sensitivity analysis. (S24 - Q5b, 04)
    - What is the objective of carrying out sensitivity analysis? (W22 - Q2a, 03)
    - Explain Sensitivity Analysis. (W23 - Q3 OR a, 03)
    - Explain Sensitivity Analysis. (S22 - Q3a, 03)

Other Important Questions (Chronological: Newest to Oldest):

1. Define the term Net Present Value (NPV). Using the net present value analysis technique, evaluate and comment on the NPVs of the two proposed projects shown in the table. The annual discount rate is 8% for each project. Also find the future value of the projects for the 7th year. [Table given - refer Question paper of Summer 2025]. (S25 - Q3c, 07)
2. List out the elements of monitoring and targeting. (S25 - Q3 OR a, 03)
3. State the techniques used for data analysis. Explain any one using neat sketch. (S25 - Q3 OR

b, 04)

4. Write brief note on technique used to represent the difference between base line and actual energy consumption over the base line period of time with sample chart. (S23 - Q2c, 07)
5. Define Present value and Net present value. (S23 - Q4a, 03)
6. Define Internal Rate of return (IRR) and state its advantages. (S23 - Q4 OR a, 03)
7. Calculate the Net Present Value for boiler replacement project. Annual savings after replacement of boiler for three years is Rs. 5,00,000, Rs. 5,50,000, Rs. 6,50,000. Total project cost is Rs 13.5 lakh. Considering cost of capital as 12%. (W22 - Q2b, 04)
8. Annual savings after replacement of boiler for three years is Rs. 5,00,000, Rs. 5,50,000, Rs. 6,50,000. Total project cost is Rs 13.5 lakh. Considering cost of capital as 12%, what is the net present value of the proposal? (S24 - Q4c, 07)
9. An energy auditor recommended to replace an old air fan... calculate 'IRR' [Full problem statement given]. (S24 - Q4 OR c, 07) [Full data given - refer Question paper of Summer 2024].
10. Answer the following questions in term of Energy Servicing Companies (ESCOs). 1) Types of Performance contract offered 2) Role and responsibilities 3) Limitation. (W22 - Q2c, 07)
11. Look at two purely fictitious lighting systems, A and B... Define the following for above case study and also calculate: 1) Simple payback 2) Five-year cash flow 3) Simple return on Investment [Table given - refer Question paper of Winter 2022]. (W22 - Q2 OR c, 07)
12. Explain financial analysis techniques: risk and sensitivity analysis. (W23 - Q2c, 07)
13. Define and explain following terms (i) Plant energy performance (ii) Production factor (iii) Reference year equivalent energy use. (W23 - Q3c, 07)
14. Differentiate between (1) Energy monitoring & targeting (2) Internal & external benchmarking. (W23 - Q3 OR c, 07)
15. Explain briefly the various elements of a monitoring and targeting system. (S22 - Q3c, 07)
16. Explain Energy Management Information Systems (EMIS) and its role in energy monitoring and targeting for industries. (W25 - Q2b, N/A)
17. Write short note on Energy Management Information Systems (EMIS). (S24 - Q5 OR c, 07)
18. Discuss the role of Energy Service Companies for financial management. (S22 - Q3b, 04)

Unit 3: Energy Management & Audit

Repeated Questions:

1. **Define Energy Management and state its objectives.** (Appears in 4 papers)
    - Define Energy Management and state its objective. (W24 - Q3a, 03)
    - Define Energy Management and state its objective. (S23 - Q3a, 03)
    - Define energy management. State the benefits of energy management. (S24 - Q4b, 04)
    - Define energy management. Explain its benefits. (W23 - Q2a, 03)
2. **Define Energy Audit and explain its types/need.** (Appears in 4 papers)
    - Define energy audit as per Energy Conservation Act 2001. List out the objectives of energy management. (W24 - Q3 OR b, 04)
    - Define Energy Audit and explain its need in short. (S23 - Q3 OR a, 03)
    - What do you mean by energy audit? Discuss types of energy audit briefly. (S24 - Q3 OR b, 04)
    - Define energy audit as per Energy Conservation Act 2001. List out the objectives of energy management. (W22 - Q3 OR a, N/A)
3. **List/Explain key instruments used for an Energy Audit.** (Appears in 4 papers)
    - List various energy audit instruments used for temperature and pressure data collection and analysis during an audit in process industry. (W25 - Q3a, N/A)
    - List out key instruments used for energy audit and explain their function. (W24 - Q3c, 07)
    - List out key instruments used for energy audit and explain their function. (S23 - Q3c, 07)
    - Give name and use of different energy audit instruments. (S24 - Q3c, 07)
4. **Classify Energy Audit and explain its phases.** (Appears in 3 papers)
    - Classify Energy Audit and explain various phases of energy audit. (W25 - Q3 OR b, N/A)
    - Distinguish between 'preliminary energy audit' and 'detailed energy audit'? (W24 - Q3 OR c, 07)
    - Classify Energy audit and explain the each phases of energy audit in detail. (S23 - Q3 OR c, 07)

Other Important Questions (Chronological: Newest to Oldest):

1. Explain how energy audits help to identify opportunities for improving the efficiency of lighting systems. (W25 - Q3 OR c, N/A)
2. Discuss pre - audit phase activities. (S22 - Q1a, 03)
3. Explain need for energy audit. (S22 - Q3 OR a, 03)
4. Discuss detailed audit or ten step methodology for energy conservation. (S25 - Q2c, 07)
5. Explain Benchmarking in short. (S25 - Q2a, 03)
6. List down the essential elements of monitoring and targeting System? (W24 - Q3 OR a, 03)
7. List down the essential elements of monitoring and targeting System? (W22 - Q3a, 03)
8. Distinguish between 'preliminary energy audit' and 'detailed energy audit'? (W22 - Q3c, 07)
9. List steps involved in 'detailed energy audit'. Give a typical energy audit reporting format. (W22 - Q3b, 07)
10. What are the base line data that an audit team should collect while conducting detailed energy audit? (W22 - Q3 OR b, 04)
11. Consider a foundry which during a monitoring Programme produces the following sample data... Calculate equation of line for predicted energy calculation. [Table given - refer Question paper of Winter 2022]. (W22 - Q3 OR c, 07)
12. Explain detailed energy audit. (W23 - Q2 OR c, 07)
13. Write short note on Bench marking. (W23 - Q3 OR b, 04)
14. Distinguish between energy conservation and energy Management. (S22 - Q3 OR b, 04)
15. Classify the energy audit & Explain the three phases of detailed energy audit. (S22 - Q3 OR c, 07)

Unit 4: Energy Efficiency in Thermal Utilities and Systems

Repeated Questions:

1. **Explain / Calculate Boiler Efficiency (Direct/Indirect Method).** (Appears in 6 papers)
    - Explain the direct and indirect methods of boiler efficiency evaluation. (W25 - Q4b, N/A)
    - Calculate the efficiency of the boiler using indirect method. [Full data given for furnace oil]. (S23 - Q4c, 07)
    - Calculate efficiency of coal fired boiler using indirect method. [Full data given]. (S23 - Q4 OR c, 07)
    - Calculate indirect efficiency of boiler for the following data. [Full data given for coal]. (W23 - Q5c, 07)
    - Find out the boiler efficiency by indirect method. [Full data given for furnace oil]. (W23 - Q5 OR c, 07)
    - The following are the data collected for a boiler using coal as the fuel. Calculate: 1) Theoretical air requirement... 5) % Heat loss due to unburnt in bottom ash. [Full data given]. (W22 - Q4 OR c, 07)
2. **Explain / Differentiate between Topping and Bottoming Cycles (Cogeneration).** (Appears in 5 papers)
    - Differentiate between cogeneration and Trigeneration techniques. (W25 - Q4 OR c, N/A)
    - Differentiate between topping and bottoming cycle in cogeneration. (S25 - Q5 OR b, 04)
    - Compare topping cycle and bottoming cycle for cogeneration. (S23 - Q4b, 04)
    - Compare topping cycle and bottoming cycle for cogeneration. (W24 - Q4 OR b, 04)
    - Why cogeneration system efficiency will be higher? Give the difference between "Topping Cycle" and "Bottoming Cycle"? (W22 - Q4 OR a, 03)
3. **Discuss Energy Conservation Opportunities / Measures for Boilers and Furnaces.** (Appears in 4 papers)
    - Enlist various energy conservation techniques for industrial furnaces. (W25 - Q4a, N/A)
    - Discuss the energy conservation opportunities for the boiler. (S25 - Q4c, 07)
    - Write a note on energy efficiency measures in the industrial furnaces. (S25 - Q5b, 04)
    - Give recommendation for efficient design of furnace. (W24 - Q5b, 04)
    - Give recommendation for efficient design of furnace. (S23 - Q5b, 04)
4. **Explain concepts related to Insulation (Economic Thickness, Importance).** (Appears in 3 papers)
    - Explain the importance of insulation in steam pipes. List common insulating techniques for steam pipes. (W25 - Q4 OR a, N/A)
    - What is the economic thickness of insulation. Discuss the factors affecting it. (S25 - Q4 OR b, 04)
    - Differentiate between insulation and refractories. (S25 - Q4 OR a, 03)
    - Explain Economic thickness of insulation. (S23 - Q3 OR b, 04)
5. **Explain / List Waste Heat Recovery techniques and benefits.** (Appears in 3 papers)
    - Enlist various energy conservation techniques for central air conditioning Plant. (W25 - Q4c, N/A)
    - What is waste heat recovery and list out devices used for waste heat recovery. (S25 - Q5 OR a, 03)
    - List the benefits of waste heat recovery system. (S24 - Q4a, 03)
    - List various sources of waste heat and potential of energy generation out waste heat. (W23 - Q4a, 03)

Other Important Questions (Chronological: Newest to Oldest):

1. Explain networking and Pinch analysis for heat exchanger performance evaluation. (W25 -

Q4 OR b, N/A)
2. Explain working of Fluidized Bed Combustion (FBC) boiler with neat sketch. (S25 - Q2b, 04)
3. Explain the terms: Boiler efficiency, cogeneration, heat exchanger effectiveness. (S25 - Q4a, 03)
4. Write a short note on Boiler blow down and how to calculate it. (S25 - Q4b, 04)
5. A counter flow double pipe heat exchanger... Determine: (a) The heat transfer area... (b) The percentage increase in area, if the fluid flows were parallel? [Full data given]. (S25 - Q5c, 07)
6. Explain working of heat pipe with neat sketch and discuss its two applications for waste heat recovery. (S25 - Q5 OR c, 07)
7. List factors affecting refrigeration and air conditioning system performance and explain any one from it. (W24 - Q3b, 04)
8. List factors affecting refrigeration and air conditioning system performance and explain any one from it. (S23 - Q3b, 04)
9. List application, advantages of Thermic fluid heaters and super critical boilers from energy conservation point of view. (W24 - Q4c, 07)
10. List application, advantages of Thermic fluid heaters and super critical boilers from energy conservation point of view. (S22 - Q4c, 07)
11. Define the following terms: Dew Point temperature, HCV, Latent heat of fusion. (W24 - Q4a, 03)
12. Define the following terms: Dew Point temperature, HCV, Latent heat of fusion. (S22 - Q4a, 03)
13. List the various types of heat loses in furnace. (S24 - Q4 OR b, 04)
14. Which instruments are required for indirect efficiency testing of boiler? (W22 - Q4a, 03)
15. Testing coal-fired boiler is more difficult than oil-fired boiler. Give reasons. (W22 - Q4b, 04)
16. A multi-storied shopping mall has installed... [Full case study on compressor replacement]. (W22 - Q4c, 07)
17. Distinguish between Regenerative and recuperative type heat exchanger. (S23 - Q4 OR b, 04)
18. Write brief note on networking and pinch analysis of heat exchangers. (W23 - Q4b, 04)
19. Explain selection procedure of optimum steam traps for condensate and flash steam recovery system in textile industry from energy conservation point of view. (W23 - Q4c, 07)
20. Explain typical ice bank system and energy savings derived out of it. (W23 - Q4 OR a, N/A)
21. How to save energy in Compressed air delivery system as well as compressor? (W23 - Q4 OR b, N/A)
22. What do you mean by co- generation? Classify co- generation system & explain bottoming cycle with sketch. (W23 - Q4 OR c, 07)
23. Explain boiler blowdown with advantages. (W23 - Q5a, 03)
24. What do you mean by co-generation? Classify co-generation system & explain bottoming cycle. (W23 - Q5b, N/A)
25. What are the disadvantages of 'direct method' of boiler efficiency evaluation over 'indirect method'? (W23 - Q5 OR a, 03)
26. Define the following terms: Boiler efficiency, Evaporation ratio, Turn down ratio, HCV. (W23 - Q5 OR b, 04)
27. Mention the various source of waste heat recovery. (S22 - Q4a, 03)
28. List advantages and applications of cogeneration. (S22 - Q4b, 04)
29. Explain techniques of energy conservation in refrigerated cold storage plants. (W24 - Q4b, 04)
30. Explain techniques of energy conservation in refrigerated cold storage plants. (S22 - Q4b, 04)

Unit 5: Energy and Environment, Climate Change

Repeated Questions:

1. **Explain the Clean Development Mechanism (CDM).** (Appears in 6 papers)
    - Explain the objectives of the Clean Development Mechanism and discuss how the CDM promotes sustainable development and greenhouse gas emission reductions. (W25 - Q5c, N/A)
    - Explain in brief about Clean Development Mechanism. (W24 - Q5c, 07)
    - Explain in brief about Clean Development Mechanism. (S23 - Q5 OR c, 07)
    - Write a short note on procedure for CDM (Clean Development Mechanism) Project cycle. (S24 - Q2 OR c, 07)
    - Give the answer for following: ...2) Clean Development Mechanism (CDM). (W22 - Q5c, 07)
    - List out the benefits for Clean Development Mechanism (CDM) to Developed and Developing countries. (W22 - Q5 OR a, 03)
2. **Explain the Kyoto Protocol.** (Appears in 4 papers)
    - Assess the effectiveness of the Kyoto Protocol in reducing greenhouse gas emissions and addressing climate change. (W25 - Q5 OR b, N/A)
    - Give the answer for following: 1) Principle of Kyoto Protocol. (W22 - Q5c, 07)
    - Explain the terms in detail: Sustainable development, Kyoto Protocol. (S22 - Q5c, 07)
    - Write short note on climate change and development of UNFCC. (S24 - Q5c, 07)
3. **Explain Bachat Lamp Yojana (BLY).** (Appears in 4 papers)
    - Explain the objectives of Bachat Lamp Yojna. (W25 - Q5 OR a, N/A)
    - Explain Bachat Lamp Yojana, its aim and benefits. (W24 - Q5c, 07)
    - Explain Bachat Lamp Yojana, its aim and benefits. (S23 - Q5c, 07)
    - How does the Bachat Lamp Yojna work? (S24 - Q5 OR a, 03)
4. **Explain the Prototype Carbon Fund (PCF).** (Appears in 3 papers)
    - What is the Prototype Carbon Fund, and what are its objectives? (W25 - Q5a, N/A)
    - State the three primary strategic objectives of Prototype Carbon Fund (PCF). (S24 - Q5a, 03)
    - What is the mission of Prototype Carbon Fund (PCF)? List out its objectives as per United Nations Framework Convention on Climate Change (UNFCC). (W22 - Q5 OR b, 04)
5. **Discuss the UNFCCC.** (Appears in 3 papers)
    - Discuss the significance of the UNFCCC in addressing global climate change challenges. (W25 - Q5b, N/A)
    - Write short note on climate change and development of UNFCC. (S24 - Q5c, 07)
    - State the roles and responsibilities of COP (Conference of the Parties). (S24 - Q5 OR b, 04)

Other Important Questions (Chronological: Newest to Oldest):

1. With examples explain how the organizations can reduce energy losses and improve process efficiency through better energy management practices. (W25 - Q5 OR c, N/A)
2. Give tips for energy saving for future. (W24 - Q5a, 03)
3. Give tips for energy saving for future. (S22 - Q5a, 03)
4. Give tips for energy savings in pumps. (S24 - Q4 OR a, 03)
5. Why steam condensate recovery is important? (W22 - Q5a, 03)
6. What are the precautions to be taken for effective steam distribution and utilization in any heating application? (W22 - Q5b, N/A)
7. Answer the following questions: 1) What are the parameters to be considered in the design of an efficient furnace? 2) What care should be taken when using furnace for proper heat distribution in a furnace? (W22 - Q5 OR c, 07)
8. Summarize the practices to be followed for proper steam trap installation. (W24 - Q5b, 04)
9. Summarize the practices to be followed for proper steam trap installation. (S23 - Q5 OR b, 04)

10. List out the various source of waste heat recovery. (S23 - Q5 OR a, 03)
11. Explain function of BEE. (S23 - Q5a, 03)
12. List out the various key instruments for carrying out energy audit. (W24 - Q5a, 03)
13. List the various key instruments for carrying out energy audit. (S22 - Q5 OR a, 03)
14. How to make lighting system of your college campus more efficient? (S22 - Q5b, 04)

****