GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO S26 – QUESTION BANK

Subject Name & Code: Energy Conservation and Management - 3161919

Chapter 1: Energy Conservation Act 2001 and BEE Schemes

Repeated Questions:

1. Energy Conservation Act 2001:

- **Q.** Write short note on / Discuss features of the Energy Conservation Act 2001. **(SUMMER 2022, 4 Marks; WINTER 2022, 7 Marks; SUMMER 2023, 7 Marks; SUMMER 2024, 4 Marks; WINTER 2024, 7 Marks; WINTER 2025, 3 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** Write short note on Energy Conservation Act-2001. **(SUMMER 2023, 7 Marks; WINTER 2024, 7 Marks)**
- **Q.** Discuss the key features of the Energy Conservation Act 2001 and state its objectives. **(WINTER 2025, 3 Marks)**
- **Q.** Discuss in brief Energy Conservation Act-2001 and its features. **(WINTER 2022, 7 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** Explain the salient features of Energy Conservation Act 2001. **(SUMMER 2024, 4 Marks)**
- **Q.** Explain Energy Conservation Act 2001 and its features, notifications under the Act. **(SUMMER 2022, 4 Marks)**

2. Bureau of Energy Efficiency (BEE) Schemes:

- **Q.** Enlist / Discuss various schemes of the Bureau of Energy Efficiency (BEE). **(SUMMER 2022, 4 Marks; WINTER 2023, 4 Marks; WINTER 2024, 4 Marks; SUMMER 2025, 7 Marks; WINTER 2025; SUMMER 2026, 7 Marks)**
- **Q.** Enlist various schemes of the Bureau of Energy Efficiency (BEE) and its benefits. **(WINTER 2025)**
- **Q.** List out the schemes of BEE. Discuss any two in detail. **(SUMMER 2025, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Briefly explain various schemes relating to Bureau of Energy Efficiency (BEE) for designated consumers, State designated agencies. **(SUMMER 2022, 4 Marks; WINTER 2024, 4 Marks)**

Other Important Questions:

1. Energy Conservation Act 2001:

- **Q.** What are the features and notifications made under Energy Conservation Act 2001? **(WINTER 2023, 3 Marks)**
- **Q.** List four important duties of energy manager in industry as per Energy Conservation Act-2001. **(WINTER 2022, 7 Marks)**

2. Bureau of Energy Efficiency (BEE):

- **Q.** How does BEE help in implementing Energy Conservation Act? **(WINTER 2023, 4 Marks)**
- **Q.** Explain function of BEE. **(SUMMER 2023, 3 Marks)**

Chapter 2: Indian Energy Scenario and Energy Security

Repeated Questions:

1. Indian Energy Scenario & Sector-wise Consumption:

- **Q.** Discuss the Indian / Sector-wise energy consumption scenario. **(WINTER 2023, 7 Marks; WINTER 2024, 7 Marks OR; SUMMER 2025, 4 Marks; WINTER 2025; SUMMER 2026, 4 Marks)**
- **Q.** Discuss sector wise energy consumption scenario in India. **(SUMMER 2025, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Discuss the sectorial energy consumption of India and the challenges faced by our country in meeting its energy demands and achieving energy security. **(WINTER 2025)**
- **Q.** Write note on 'Indian Energy scenario'. **(WINTER 2024, 7 Marks OR)**
- **Q.** Write short note on Indian Energy scenario. **(WINTER 2023, 7 Marks)**

2. Energy Security:

- **Q.** Define / Explain Energy Security. **(SUMMER 2022, 4 Marks; SUMMER 2022, 7 Marks; WINTER 2022, 3 Marks; SUMMER 2024, 3 Marks)**
- **Q.** Define energy security. Enlist different strategies to achieve it. **(WINTER 2022, 3 Marks)**
- **Q.** What is energy security? Explain how it can be achieved? **(SUMMER 2022, 4 Marks)**
- **Q.** Define energy security. Enlist different strategies to achieve it and discuss role of energy conservation to achieve energy security. **(SUMMER 2022, 7 Marks)**
- **Q.** Write short note on energy security. **(SUMMER 2024, 3 Marks)**

Other Important Questions:

1. Indian Energy Scenario:

- **Q.** Explain long term energy scenario for India. **(SUMMER 2024, 7 Marks)**
- **Q.** Discuss India's present energy scenario and long-term energy scenario. **(WINTER 2022, 4 Marks)**

2. Energy Sector Reforms:

- **Q.** Explain need of energy sector reforms in India. **(SUMMER 2024, 7 Marks)**

Chapter 3: Energy Sources and Definitions

Repeated Questions:

1. Renewable and Non-Renewable Energy:

- **Q.** Define Renewable and Non-Renewable Energy. / Define i) Renewable Energy ii) Non-Renewable Energy iii) Per Capita energy consumption. **(SUMMER 2023, 3 Marks; WINTER 2024, 3 Marks)**

Other Important Questions:

1. Classification of Energy Sources:

- **Q.** Classify energy sources. **(WINTER 2023, 3 Marks)**
- **Q.** Differentiate between primary and secondary sources and state examples of each. **(WINTER 2025)**

2. Definitions:

- **Q.** Define: a) Bench Marking b) ESCOs c) BEE. **(SUMMER 2024, 3 Marks)**

Chapter 4: Energy Conservation, ECBC, Electricity Act, Energy Pricing and Duties

Repeated Questions:

1. Energy Conservation – Definition & Importance:

- **Q.** Define Energy Conservation and explain its importance. **(SUMMER 2023, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Explain energy conservation and its importance by giving an example. **(SUMMER 2026, 4 Marks)**

2. Energy Conservation Building Code (ECBC):

- **Q.** Define the Energy Conservation Building Code (ECBC) and its significance in promoting energy-efficient building construction. / Write brief note on ECBC code for Building construction. **(SUMMER 2022, 7 Marks; WINTER 2025)**

Other Important Questions:

1. Basic Terms & Energy Pricing:

- **Q.** Explain: (1) Power factor (2) Energy audit (3) Non-commercial energy. **(SUMMER 2025, 3 Marks)**
- **Q.** Define energy pricing. **(SUMMER 2024, 3 Marks)**

2. Electricity Act 2003:

- **Q.** 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. **(WINTER 2025 OR)**

Chapter 5: Financial Analysis Techniques

Repeated Questions:

1. SPP, ROI, NPV and IRR – Terms & Comparison:

- **Q.** Explain / Define Simple Payback Period, Return on Investment (ROI), Net Present Value (NPV), and Internal Rate of Return (IRR). **(SUMMER 2022, 3 Marks; SUMMER 2023, 4 Marks; WINTER 2023, 4 Marks; WINTER 2023, 7 Marks; WINTER 2024, 3 Marks; SUMMER 2025, 3 Marks; WINTER 2025; SUMMER 2026, 3 Marks)**
- **Q.** Explain the following terms: Simple payback period, return on investment (ROI), net present value (NPV), and internal rate of return (IRR). **(WINTER 2025)**
- **Q.** Explain the terms: Payback period, Cashflow and Return on Investment. **(SUMMER 2025, 3 Marks; SUMMER 2026, 3 Marks)**
- **Q.** Compare Net Present Value and Internal Rate of Return. **(SUMMER 2022, 3 Marks; WINTER 2024, 3 Marks)**
- **Q.** Differentiate between i) Simple payback period and Return on Investment. **(SUMMER 2023, 4 Marks)**
- **Q.** Define the terms: Return on Investment, Net Present Value, Internal Rate of Return, Time value of money. **(WINTER 2023, 4 Marks)**
- **Q.** Define the following terms: (i) SPP (ii) Present value of money (iii) ROI (iv) NPV (v) IRR. **(WINTER 2023, 7 Marks; SUMMER 2026, 3 Marks)**

2. NPV Numerical – Boiler Replacement Project:

- **Q.** Calculate the Net Present Value for boiler replacement project. Annual savings after replacement of boiler for three years are Rs. 5,00,000, Rs. 5,50,000 and 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? **(WINTER 2022, 4 Marks; SUMMER 2024, 7 Marks)**

Other Important Questions:

1. Net Present Value (NPV) – Numericals:

- **Q.** 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. [Diagram required – refer to the original question paper of SUMMER 2025] **(SUMMER 2025, 7 Marks)**
- **Q.** Using the net present value analysis technique, evaluate the financial merits of the two proposed projects shown in the table below. The annual discount rate is 8.5% for each project. Also state the advantages of the Net present value method used. Data – Capital cost: Project 1 = Rs. 25000, Project 2 = Rs. 25000. Net annual savings (Rs.), Year 1 to Year 6: Project 1 = +7000, +6000, +6500, +6500, +5500, +7500; Project 2 = +6500, +7500, +7000, +7000, +5500, +5500. Total savings at the end of the 6th year: +39000 for each project. **(SUMMER 2026, 7 Marks)**

2. Present Value, NPV and IRR – Definitions:

- **Q.** Define Present value and Net present value. **(SUMMER 2023, 3 Marks)**
- **Q.** Define Internal Rate of return (IRR) and state its advantages. **(SUMMER 2023, 3 Marks OR)**

3. IRR, Payback & Cash Flow Numericals:

- **Q.** An energy auditor recommended to replace an old air fan... calculate 'IRR'. [Diagram required – refer to the original question paper of SUMMER 2024] **(SUMMER 2024, 7 Marks OR)**
- **Q.** 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. [Diagram required – refer to the original question paper of WINTER 2022] **(WINTER 2022, 7 Marks OR)**

4. Risk Analysis & Cash Flows:

- **Q.** Explain financial analysis techniques: risk and sensitivity analysis. **(WINTER 2023, 7 Marks)**
- **Q.** Write a note on Cash flows. **(SUMMER 2026, 4 Marks OR)**

Chapter 6: Monitoring & Targeting, CUSUM, Sensitivity and EMIS

Repeated Questions:

1. Benefits of Energy Monitoring and Targeting (M&T):

- **Q.** Explain / List benefits of Energy Monitoring and Targeting (M&T). **(SUMMER 2023, 3 Marks; WINTER 2023, 7 Marks OR; SUMMER 2024, 3 Marks OR; WINTER 2024, 4 Marks)**
- **Q.** List benefits of Energy Monitoring and Targeting. **(SUMMER 2023, 3 Marks; WINTER 2024, 4 Marks)**
- **Q.** Explain benefits of energy monitoring and targeting. **(SUMMER 2024, 3 Marks OR)**
- **Q.** What are the benefits of monitoring & targeting system? **(WINTER 2023, 7 Marks OR)**

2. Elements of Monitoring and Targeting System:

- **Q.** List / Briefly explain the essential elements of energy monitoring and targeting system. **(SUMMER 2022, 7 Marks; WINTER 2022, 3 Marks; SUMMER 2024, 4 Marks; WINTER 2024, 3 Marks OR; SUMMER 2025, 3 Marks OR; SUMMER 2026, 4 Marks)**
- **Q.** Briefly explain essential elements of energy monitoring system. **(SUMMER 2024, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** List out the elements of monitoring and targeting. **(SUMMER 2025, 3 Marks OR; SUMMER 2026, 4 Marks)**
- **Q.** Explain briefly the various elements of a monitoring and targeting system. **(SUMMER 2022, 7 Marks)**
- **Q.** List down the essential elements of monitoring and targeting System? **(WINTER 2022, 3 Marks; WINTER 2024, 3 Marks OR)**

3. CUSUM Analysis:

- **Q.** Explain / Perform CUSUM Analysis. **(SUMMER 2022, 7 Marks OR; SUMMER 2024, 4 Marks; SUMMER 2025, 7 Marks OR; WINTER 2025)**
- **Q.** Explain the concept of the cumulative sum of differences (CUSUM) analysis for detecting changes in energy performance. **(WINTER 2025)**
- **Q.** The energy production data of an industry follows a relationship... Using CUSUM technique, calculate energy savings... [Diagram required – refer to the original question paper of SUMMER 2025] **(SUMMER 2025, 7 Marks OR)**
- **Q.** Explain steps involved in CUSUM analysis. **(SUMMER 2024, 4 Marks)**
- **Q.** Explain the importance of CUSUM chart and its procedure to analyze the case with help of diagrams. **(SUMMER 2022, 7 Marks OR)**

4. Sensitivity Analysis:

- **Q.** Explain Sensitivity Analysis. **(SUMMER 2022, 3 Marks; WINTER 2022, 3 Marks; WINTER 2023, 3 Marks OR; SUMMER 2024, 4 Marks)**
- **Q.** What is the objective of carrying out sensitivity analysis? **(WINTER 2022, 3 Marks)**

5. Energy Management Information Systems (EMIS):

- **Q.** Explain / Write short note on Energy Management Information Systems (EMIS). **(SUMMER 2024, 7 Marks OR; WINTER 2025; SUMMER 2026, 3 Marks OR)**
- **Q.** Explain Energy Management Information Systems (EMIS) and its role in energy monitoring and targeting for industries. **(WINTER 2025)**
- **Q.** Write short note on Energy Management Information Systems (EMIS). **(SUMMER 2024, 7 Marks OR; SUMMER 2026, 3 Marks OR)**
- **Q.** What is EMIS? State its advantages. **(SUMMER 2026, 3 Marks OR)**

Other Important Questions:

1. Data Analysis Techniques:

- **Q.** State the techniques used for data analysis. Explain any one using neat sketch. **(SUMMER 2025, 4 Marks OR)**

2. CUSUM – Technique & Numerical:

- **Q.** 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. **(SUMMER 2023, 7 Marks)**
- **Q.** The energy production data (for Jan-April, 2015) of an industry follows a relationship: Calculated Energy consumption = 0.5P + 220. A heat recovery system was installed at the end of April 2015, and further data was gathered up to December, 2015. Using CUSUM technique, calculate energy savings in terms of ton of oil equivalent (toe) and the reduction in specific energy consumption achieved with the installation of waste heat recovery system. Plant data (2015 month: actual energy consumption in toe/month; actual production in ton/month) – May: 530, 620; June: 540, 670; July: 590, 760; Aug: 605, 820; Sept: 670, 940; Oct: 582, 750; Nov: 540, 610; Dec: 540, 670. **(SUMMER 2026, 7 Marks OR)**

3. M&T and Benchmarking:

- **Q.** Differentiate between (1) Energy monitoring & targeting (2) Internal & external benchmarking. **(WINTER 2023, 7 Marks OR)**

Chapter 7: Energy Service Companies (ESCOs)

Repeated Questions:

1. Role and Concept of ESCOs:

- **Q.** Explain the role / concept of Energy Service Companies (ESCOs). **(WINTER 2022, 7 Marks; SUMMER 2023, 7 Marks OR; WINTER 2023, 4 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 4 Marks; WINTER 2025 OR)**
- **Q.** Explain the role of Energy Service Companies (ESCOs) from the energy conservation point of view. **(WINTER 2025 OR)**
- **Q.** What is ESCOs? Discuss the role of ESCOs. **(SUMMER 2025, 4 Marks)**
- **Q.** Answer the following questions in terms of Energy Service Companies (ESCOs): 1) Types of Performance contract offered 2) Role and responsibilities 3) Limitation. **(WINTER 2022, 7 Marks; WINTER 2024, 7 Marks)**
- **Q.** Explain role of the ESCOs in detail. **(SUMMER 2023, 7 Marks OR)**
- **Q.** Discuss the role of Energy Service Companies (ESCOs). **(WINTER 2023, 4 Marks)**

Other Important Questions:

1. ESCOs and Financial Management:

- **Q.** Discuss the role of Energy Service Companies for financial management. **(SUMMER 2022, 4 Marks)**

Chapter 8: Energy Management and Energy Audit

Repeated Questions:

1. Energy Management – Definition & Objectives:

- **Q.** Define Energy Management and state its objectives. **(SUMMER 2023, 3 Marks; WINTER 2023, 3 Marks; SUMMER 2024, 4 Marks; WINTER 2024, 3 Marks; SUMMER 2026, 3 Marks)**
- **Q.** Define energy management. State the benefits of energy management. **(SUMMER 2024, 4 Marks)**
- **Q.** Define energy management. Explain its benefits. **(WINTER 2023, 3 Marks)**

2. Energy Audit – Definition, Types & Need:

- **Q.** Define Energy Audit and explain its types/need. **(WINTER 2022 OR; SUMMER 2023, 3 Marks OR; SUMMER 2024, 4 Marks OR; WINTER 2024, 4 Marks OR)**
- **Q.** Define energy audit as per Energy Conservation Act 2001. List out the objectives of energy management. **(WINTER 2022 OR; WINTER 2024, 4 Marks OR)**
- **Q.** Define Energy Audit and explain its need in short. **(SUMMER 2023, 3 Marks OR)**
- **Q.** What do you mean by energy audit? Discuss types of energy audit briefly. **(SUMMER 2024, 4 Marks OR)**

3. Key Instruments for Energy Audit:

- **Q.** List / Explain key instruments used for an Energy Audit. **(SUMMER 2023, 7 Marks; SUMMER 2024, 7 Marks; WINTER 2024, 7 Marks; WINTER 2025; SUMMER 2026, 4 Marks)**
- **Q.** List various energy audit instruments used for temperature and pressure data collection and analysis during an audit in process industry. **(WINTER 2025)**
- **Q.** List out key instruments used for energy audit and explain their function. **(SUMMER 2023, 7 Marks; WINTER 2024, 7 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Give name and use of different energy audit instruments. **(SUMMER 2024, 7 Marks)**
- **Q.** List out the various key instruments for carrying out energy audit. **(SUMMER 2022, 3 Marks OR; WINTER 2024, 3 Marks)**

4. Classification and Phases of Energy Audit:

- **Q.** Classify Energy Audit and explain its phases. **(SUMMER 2022, 7 Marks OR; SUMMER 2023, 7 Marks OR; WINTER 2024, 7 Marks OR; WINTER 2025 OR)**
- **Q.** Classify Energy Audit and explain various phases of energy audit. **(WINTER 2025 OR)**
- **Q.** Classify Energy audit and explain the each phases of energy audit in detail. **(SUMMER 2023, 7 Marks OR)**
- **Q.** Classify the energy audit & Explain the three phases of detailed energy audit. **(SUMMER 2022, 7 Marks OR)**
- **Q.** Distinguish between ‘preliminary energy audit’ and ‘detailed energy audit’? **(WINTER 2022, 7 Marks; WINTER 2024, 7 Marks OR)**

5. Detailed Energy Audit – Steps:

- **Q.** Discuss detailed audit or ten step methodology / steps for detailed energy audit. **(SUMMER 2025, 7 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** Discuss detailed audit or ten step methodology for energy conservation. **(SUMMER 2025, 7 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** Discuss the steps for detailed energy audit. **(SUMMER 2026, 7 Marks OR)**

6. Benchmarking:

- **Q.** Explain Benchmarking in short. / Write short note on Bench marking. **(WINTER 2023, 4 Marks OR; SUMMER 2025, 3 Marks)**

Other Important Questions:

1. Energy Audit – Need & Pre-Audit Phase:

- **Q.** Explain need for energy audit. **(SUMMER 2022, 3 Marks OR)**
- **Q.** Discuss pre-audit phase activities. **(SUMMER 2022, 3 Marks)**

2. Detailed Energy Audit:

- **Q.** Explain detailed energy audit. **(WINTER 2023, 7 Marks OR)**
- **Q.** List steps involved in 'detailed energy audit'. Give a typical energy audit reporting format. **(WINTER 2022, 7 Marks)**
- **Q.** What are the base line data that an audit team should collect while conducting detailed energy audit? **(WINTER 2022, 4 Marks OR)**
- **Q.** Consider a foundry which during a monitoring Programme produces the following sample data... Calculate equation of line for predicted energy calculation. [Diagram required – refer to the original question paper of WINTER 2022] **(WINTER 2022, 7 Marks OR)**

3. Energy Audit and Lighting Systems:

- **Q.** Explain how energy audits help to identify opportunities for improving the efficiency of lighting systems. **(WINTER 2025 OR)**
- **Q.** How to make lighting system of your college campus more efficient? **(SUMMER 2022, 4 Marks)**

4. Energy Management vs Energy Conservation:

- **Q.** Distinguish between energy conservation and energy Management. **(SUMMER 2022, 4 Marks OR)**

5. Terms & Definitions:

- **Q.** Define: Energy Audit, Designated Consumers, ESCOs. **(SUMMER 2026, 3 Marks)**
- **Q.** Define and explain following terms (i) Plant energy performance (ii) Production factor (iii) Reference year equivalent energy use. **(WINTER 2023, 7 Marks)**

Chapter 9: Boilers, Cogeneration, Furnaces, Insulation and Waste Heat Recovery

Repeated Questions:

1. Boiler Efficiency Evaluation:

- **Q.** Explain / Calculate Boiler Efficiency (Direct/Indirect Method). **(WINTER 2022, 7 Marks OR; SUMMER 2023, 7 Marks; SUMMER 2023, 7 Marks OR; WINTER 2023, 7 Marks; WINTER 2023, 7 Marks OR; WINTER 2025)**
- **Q.** Explain the direct and indirect methods of boiler efficiency evaluation. **(WINTER 2025)**
- **Q.** Calculate the efficiency of the boiler using indirect method. [Diagram required – refer to the original question paper of SUMMER 2023] **(SUMMER 2023, 7 Marks - furnace oil)**
- **Q.** Calculate efficiency of coal fired boiler using indirect method. [Diagram required – refer to the original question paper of SUMMER 2023] **(SUMMER 2023, 7 Marks OR)**
- **Q.** Calculate indirect efficiency of boiler for the following data. [Diagram required – refer to the original question paper of WINTER 2023] **(WINTER 2023, 7 Marks - coal)**
- **Q.** Find out the boiler efficiency by indirect method. [Diagram required – refer to the original question paper of WINTER 2023] **(WINTER 2023, 7 Marks OR - furnace oil)**
- **Q.** 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. [Diagram required – refer to the original question paper of WINTER 2022] **(WINTER 2022, 7 Marks OR)**

2. Boiler Blowdown:

- **Q.** Explain boiler blowdown, its necessity and advantages. **(WINTER 2023, 3 Marks; SUMMER 2025, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Write a short note on Boiler blow down and how to calculate it. **(SUMMER 2025, 4 Marks)**
- **Q.** Explain boiler blowdown with advantages. **(WINTER 2023, 3 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Explain Blow down, its necessity and its advantages. **(SUMMER 2026, 4 Marks)**

3. Cogeneration:

- **Q.** Explain / Differentiate between Topping and Bottoming Cycles (Cogeneration). **(WINTER 2022, 3 Marks OR; SUMMER 2023, 4 Marks; WINTER 2024, 4 Marks OR; SUMMER 2025, 4 Marks OR; WINTER 2025 OR; SUMMER 2026, 3 Marks OR)**
- **Q.** Differentiate between cogeneration and Trigeneration techniques. **(WINTER 2025 OR)**
- **Q.** Differentiate between topping and bottoming cycle in cogeneration. **(SUMMER 2025, 4 Marks OR; SUMMER 2026, 3 Marks OR)**
- **Q.** Compare topping cycle and bottoming cycle for cogeneration. **(SUMMER 2023, 4 Marks; WINTER 2024, 4 Marks OR)**
- **Q.** Why cogeneration system efficiency will be higher? Give the difference between “Topping Cycle” and “Bottoming Cycle”? **(WINTER 2022, 3 Marks OR)**
- **Q.** What do you mean by co-generation? Classify co-generation system & explain bottoming cycle (with sketch). **(WINTER 2023, 7 Marks OR; WINTER 2023)**

4. Furnaces & Energy Conservation Opportunities for Boilers:

- **Q.** Discuss Energy Conservation Opportunities / Measures for Boilers and Furnaces. **(SUMMER 2023, 4 Marks; WINTER 2024, 4 Marks; SUMMER 2025, 7 Marks; SUMMER 2025, 4 Marks; WINTER 2025; SUMMER 2026, 7 Marks)**
- **Q.** Enlist various energy conservation techniques for industrial furnaces. **(WINTER 2025)**
- **Q.** Discuss the energy conservation opportunities for the boiler. **(SUMMER 2025, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Write a note on energy efficiency measures in the industrial furnaces. **(SUMMER 2025, 4 Marks)**

- **Q.** Give recommendation for efficient design of furnace. **(SUMMER 2023, 4 Marks; WINTER 2024, 4 Marks)**
- **Q.** List / Discuss the various losses in fuel fired furnaces. **(SUMMER 2024, 4 Marks OR; SUMMER 2026, 7 Marks)**
- **Q.** List the various types of heat losses in furnace. **(SUMMER 2024, 4 Marks OR)**
- **Q.** Discuss various losses in the fuel fired furnaces in detail. **(SUMMER 2026, 7 Marks)**

5. Insulation:

- **Q.** Explain concepts related to Insulation (Economic Thickness, Importance). **(SUMMER 2023, 4 Marks OR; SUMMER 2025, 4 Marks OR; SUMMER 2025, 3 Marks OR; WINTER 2025 OR; SUMMER 2026, 4 Marks OR)**
- **Q.** Explain the importance of insulation in steam pipes. List common insulating techniques for steam pipes. **(WINTER 2025 OR)**
- **Q.** What is the economic thickness of insulation. Discuss the factors affecting it. **(SUMMER 2025, 4 Marks OR; SUMMER 2026, 4 Marks OR)**
- **Q.** Differentiate between insulation and refractories. **(SUMMER 2025, 3 Marks OR)**
- **Q.** Explain Economic thickness of insulation. **(SUMMER 2023, 4 Marks OR)**

6. Waste Heat Recovery:

- **Q.** Explain / List Waste Heat Recovery techniques and benefits. **(WINTER 2023, 3 Marks; SUMMER 2024, 3 Marks; SUMMER 2025, 3 Marks OR; WINTER 2025; SUMMER 2026, 7 Marks OR)**
- **Q.** What is waste heat recovery and list out devices used for waste heat recovery. **(SUMMER 2025, 3 Marks OR; SUMMER 2026, 7 Marks OR)**
- **Q.** List the benefits of waste heat recovery system. **(SUMMER 2024, 3 Marks)**
- **Q.** List various sources of waste heat and potential of energy generation out waste heat. **(WINTER 2023, 3 Marks)**
- **Q.** Mention / List out the various sources of waste heat recovery. **(SUMMER 2022, 3 Marks; SUMMER 2023, 3 Marks OR)**

7. Heat Exchangers – Networking & Pinch Analysis:

- **Q.** Explain networking and pinch analysis of heat exchangers. **(WINTER 2023, 4 Marks; WINTER 2025 OR)**
- **Q.** Explain networking and Pinch analysis for heat exchanger performance evaluation. **(WINTER 2025 OR)**
- **Q.** Write brief note on networking and pinch analysis of heat exchangers. **(WINTER 2023, 4 Marks)**

8. Steam Traps:

- **Q.** Summarize the practices to be followed for proper steam trap installation. **(SUMMER 2023, 4 Marks OR; WINTER 2024, 4 Marks)**

9. Refrigeration, Cold Storage & Thermic Fluid Heaters:

- **Q.** Explain techniques of energy conservation in refrigerated cold storage plants. **(SUMMER 2022, 4 Marks; WINTER 2024, 4 Marks)**
- **Q.** List factors affecting refrigeration and air conditioning system performance and explain any one from it. **(SUMMER 2023, 4 Marks; WINTER 2024, 4 Marks)**
- **Q.** List application, advantages of Thermic fluid heaters and super critical boilers from energy conservation point of view. **(SUMMER 2022, 7 Marks; WINTER 2024, 7 Marks)**

10. Definitions – Dew Point, HCV, Latent Heat:

- **Q.** Define the following terms: Dew Point temperature, HCV, Latent heat of fusion. **(SUMMER 2022, 3 Marks; WINTER 2024, 3 Marks)**

Other Important Questions:

1. Boilers – Operation & Testing:

- **Q.** Explain working of Fluidized Bed Combustion (FBC) boiler with neat sketch. **(SUMMER 2025, 4 Marks)**
- **Q.** Which instruments are required for indirect efficiency testing of boiler? **(WINTER 2022, 3 Marks)**
- **Q.** Testing coal-fired boiler is more difficult than oil-fired boiler. Give reasons. **(WINTER 2022, 4 Marks)**
- **Q.** What are the disadvantages of 'direct method' of boiler efficiency evaluation over 'indirect method'? **(WINTER 2023, 3 Marks OR)**
- **Q.** Explain Deaeration treatment for the boiler water. **(SUMMER 2026, 3 Marks)**

2. Boiler & Heat Exchanger Terms:

- **Q.** Explain the terms: Boiler efficiency, cogeneration, heat exchanger effectiveness. **(SUMMER 2025, 3 Marks)**
- **Q.** Define the plant energy performance, Efficiency of the boiler, Heat Exchanger effectiveness. **(SUMMER 2026, 3 Marks OR)**
- **Q.** Define the following terms: Boiler efficiency, Evaporation ratio, Turn down ratio, HCV. **(WINTER 2023, 4 Marks OR)**

3. Heat Exchangers & Waste Heat Recovery Devices:

- **Q.** 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? [Diagram required – refer to the original question paper of SUMMER 2025] **(SUMMER 2025, 7 Marks)**
- **Q.** Explain working of heat pipe with neat sketch and discuss its two applications for waste heat recovery. **(SUMMER 2025, 7 Marks OR)**
- **Q.** Distinguish between Regenerative and recuperative type heat exchanger. **(SUMMER 2023, 4 Marks OR)**
- **Q.** State various types of waste heat recovery devices. Explain working of any one waste heat recovery device with neat sketches. **(SUMMER 2026, 7 Marks OR)**

4. Cogeneration – Advantages & Applications:

- **Q.** List advantages and applications of cogeneration. **(SUMMER 2022, 4 Marks)**

5. Steam System:

- **Q.** Explain selection procedure of optimum steam traps for condensate and flash steam recovery system in textile industry from energy conservation point of view. **(WINTER 2023, 7 Marks)**
- **Q.** What is steam traps? State its functions and benefits of providing steam traps in a steam system. **(SUMMER 2026, 4 Marks)**
- **Q.** Why steam condensate recovery is important? **(WINTER 2022, 3 Marks)**
- **Q.** What are the precautions to be taken for effective steam distribution and utilization in any heating application? **(WINTER 2022)**

6. Furnace Design:

- **Q.** 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? **(WINTER 2022, 7 Marks OR)**

7. Air Conditioning, Ice Bank & Compressed Air:

- **Q.** Enlist various energy conservation techniques for central air conditioning Plant. **(WINTER 2025)**
- **Q.** Explain typical ice bank system and energy savings derived out of it. **(WINTER 2023 OR)**

- **Q.** How to save energy in Compressed air delivery system as well as compressor? **(WINTER 2023 OR)**

8. Case Study:

- **Q.** A multi-storied shopping mall has installed... [Full case study on compressor replacement] [Diagram required – refer to the original question paper of WINTER 2022] **(WINTER 2022, 7 Marks)**

Chapter 10: CDM, Kyoto Protocol, BLY, PCF, UNFCCC and Climate Change

Repeated Questions:

1. Clean Development Mechanism (CDM):

- **Q.** Explain the Clean Development Mechanism (CDM). **(WINTER 2022, 7 Marks; WINTER 2022, 3 Marks; SUMMER 2023, 7 Marks OR; SUMMER 2024, 7 Marks OR; WINTER 2024, 7 Marks; WINTER 2025; SUMMER 2026, 7 Marks)**
- **Q.** Explain the objectives of the Clean Development Mechanism and discuss how the CDM promotes sustainable development and greenhouse gas emission reductions. **(WINTER 2025)**
- **Q.** Explain in brief about Clean Development Mechanism. **(SUMMER 2023, 7 Marks OR; WINTER 2024, 7 Marks)**
- **Q.** Write a short note on procedure for CDM (Clean Development Mechanism) Project cycle. **(SUMMER 2024, 7 Marks OR)**
- **Q.** What is CDM? Write a note on CDM Methodology and its project cycle with neat sketch. **(SUMMER 2026, 7 Marks)**
- **Q.** Give the answer for following: ...2) Clean Development Mechanism (CDM). **(WINTER 2022, 7 Marks)**
- **Q.** List out the benefits for Clean Development Mechanism (CDM) to Developed and Developing countries. **(WINTER 2022, 3 Marks OR)**

2. Kyoto Protocol:

- **Q.** Explain the Kyoto Protocol. **(SUMMER 2022, 7 Marks; WINTER 2022, 7 Marks; WINTER 2025 OR)**
- **Q.** Assess the effectiveness of the Kyoto Protocol in reducing greenhouse gas emissions and addressing climate change. **(WINTER 2025 OR)**
- **Q.** Give the answer for following: 1) Principle of Kyoto Protocol. **(WINTER 2022, 7 Marks)**
- **Q.** Explain the terms in detail: Sustainable development, Kyoto Protocol. **(SUMMER 2022, 7 Marks)**

3. Bachat Lamp Yojana (BLY):

- **Q.** Explain Bachat Lamp Yojana (BLY). **(SUMMER 2023, 7 Marks; SUMMER 2024, 3 Marks OR; WINTER 2024, 7 Marks; WINTER 2025 OR)**
- **Q.** Explain the objectives of Bachat Lamp Yojana. **(WINTER 2025 OR)**
- **Q.** Explain Bachat Lamp Yojana, its aim and benefits. **(SUMMER 2023, 7 Marks; WINTER 2024, 7 Marks)**
- **Q.** How does the Bachat Lamp Yojana work? **(SUMMER 2024, 3 Marks OR)**

4. Prototype Carbon Fund (PCF):

- **Q.** Explain the Prototype Carbon Fund (PCF). **(WINTER 2022, 4 Marks OR; SUMMER 2024, 3 Marks; WINTER 2025)**
- **Q.** What is the Prototype Carbon Fund, and what are its objectives? **(WINTER 2025)**
- **Q.** State the three primary strategic objectives of Prototype Carbon Fund (PCF). **(SUMMER 2024, 3 Marks)**
- **Q.** What is the mission of Prototype Carbon Fund (PCF)? List out its objectives as per United Nations Framework Convention on Climate Change (UNFCCC). **(WINTER 2022, 4 Marks OR)**

5. UNFCCC:

- **Q.** Discuss the UNFCCC. **(SUMMER 2024, 7 Marks; SUMMER 2024, 4 Marks OR; WINTER 2025)**
- **Q.** Discuss the significance of the UNFCCC in addressing global climate change challenges. **(WINTER 2025)**
- **Q.** Write short note on climate change and development of UNFCCC. **(SUMMER 2024, 7 Marks)**

- **Q.** State the roles and responsibilities of COP (Conference of the Parties). **(SUMMER 2024, 4 Marks OR)**

6. Energy Saving Tips:

- **Q.** Give tips for energy saving for future. **(SUMMER 2022, 3 Marks; WINTER 2024, 3 Marks)**
- **Q.** Give tips for energy savings in pumps. **(SUMMER 2024, 3 Marks OR)**

Other Important Questions:

1. Energy Management Practices:

- **Q.** With examples explain how the organizations can reduce energy losses and improve process efficiency through better energy management practices. **(WINTER 2025 OR)**

2. Climate Change Policy:

- **Q.** List the missions under the National Action Plan for the climate change. **(SUMMER 2026, 3 Marks)**

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