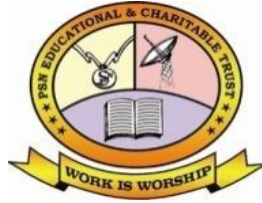


PSN COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING



QUESTION BANK

EE650801 - Energy Audit and Environment Management (Regulation – 2022)

Electrical and Electronics Engineering

Academic Year 2024 – 2025(ODD SEM)

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QUESTION BANK

Course Name: Energy Audit and Environment Management

Code : EE650801

CO1	Understand the renewable energy source and non-renewable energy source
CO2	Express the concept of energy source conversion
CO3	Express the concept of depletion of energy resources and its impact on economy
CO4	Understand the sector wise energy consumption
CO5	Understand energy conversion act

UNIT 1: GENERAL ASPECTS OF ENERGY AUDIT

Definition, energy audit, need, types of energy audit. Understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, smart metering. Roles and responsibilities of energy manager, accountability. energy consumption, production, cumulative sum of differences (CUSUM) – Cost / Energy Share Diagram – Break Even Analysis.

PART A(2 Mark)

Q. No	Questions	BT Level	Competence	CO
1.	Define energy audit.	BTL 1	Remember	1
2.	What is the need for an energy audit?	BTL 1	Remember	1
3.	List the types of energy audits.	BTL 2	Understand	1
4.	What is a preliminary energy audit?	BTL 2	Understand	1
5.	Describe a detailed energy audit.	BTL 2	Understand	1
6.	Explain the concept of energy costs.	BTL 3	Analyze	1
7.	What is benchmarking in energy management?	BTL 1	Remember	1
8.	Define energy performance.	BTL 1	Remember	1
9.	How does matching energy use to requirements help in energy management?	BTL 2	Understand	1
10	What does maximizing system efficiencies entail?	BTL 2	Understand	1

11	What is smart metering?	BTL 1	Remember	1
12	What are the roles of an energy manager?	BTL 2	Understand	1
13	Why is accountability important in energy management?	BTL 2	Understand	1
14	What is energy consumption analysis?	BTL 2	Understand	1
15	Explain the production process in relation to energy use.	BTL 2	Understand	1
16	What is the cumulative sum of differences (CUSUM) in energy management?	BTL 2	Understand	1
17	Describe a Cost / Energy Share Diagram.	BTL 3	Analyze	1
18	What is Break Even Analysis in energy management?	BTL 2	Understand	1
18	How does understanding energy costs aid in energy management?	BTL 2	Understand	1
20	What is the significance of energy consumption in industrial processes?	BTL 2	Understand	1

PART B(13 Mark)

1.	Explain the concept of an energy audit and its importance in modern industrial practices.	BTL 4	Analyse	1
2.	Discuss the various types of energy audits and their applications in different industries.	BTL 4	Analyse	1
3.	How can energy benchmarking help organizations improve their energy efficiency? Provide examples.	BTL 4	Analyse	1
4.	Describe the roles and responsibilities of an energy manager in implementing successful energy management practices.	BTL 4	Analyse	1
5.	Explain the concept of matching energy use to requirements and its significance in energy management.	BTL 4	Analyse	1
6.	Discuss the concept of CUSUM in energy management and its role in detecting energy consumption patterns.	BTL 4	Analyse	1

7.	Explain the different types of energy audits and their applicability in various scenarios.	BTL 4	Analyse	1
8.	Explain the concept of bench marking in energy audit. How is the cumulative sum of differences (CUSUM) used in energy audit analysis?	BTL 4	Analyse	1
Part-C (1X15)				
1	Conduct an energy audit for a manufacturing plant to identify energy-saving opportunities.	BTL 4	Analyse	1
2	Benchmark the energy performance in a commercial building and propose efficiency measures.	BTL 4	Analyse	1

UNIT 2: ENERGY AUDIT IN MOTORS AND TRANSFORMERS

Losses in induction motors - factors affecting motor performance - variable speed drives - Energy audit procedures in induction motor and its drives - energy saving opportunities with energy efficient motors - soft starters with energy saver.

Transformer – AVR & OLTC Concepts – Selection of Transformers – Performance Prediction -transformer losses Energy Efficient Transformers.**PART-A (2 Marks)**

Q.No	Questions	BT Level	Competence	CO
1.	What are the main losses in induction motors?	BTL 2	Understand	2
2.	How do factors affecting motor performance impact efficiency?	BTL 2	Understand	2
3.	What is a variable speed drive (VSD)?	BTL 1	Remember	2
4.	Describe the energy audit procedure for induction motors.	BTL 3	Analysis	2
5.	What are the energy-saving opportunities with energy-efficient motors?	BTL 2	Understand	2
6.	Explain the function of soft starters with energy savers.	BTL 3	Analysis	2
7.	What is a transformer?	BTL 1	Remember	2
8.	What are AVR and OLTC concepts in transformers?	BTL 2	Understand	2
9.	How do you select a transformer for energy efficiency?	BTL 2	Understand	2
10	What is performance prediction in transformers?	BTL 2	Understand	2
11	Explain transformer losses.	BTL 3	Analysis	2

12	What are energy-efficient transformers?	BTL 2	Understand	2
13	How does load affect induction motor efficiency?	BTL 2	Understand	2
14	What role does maintenance play in motor performance?	BTL 2	Understand	2
15	How can variable speed drives save energy?	BTL 2	Understand	2
16	Describe the energy audit process for motor drives.	BTL 3	Analysis	2
17	What factors should be considered in transformer selection?	BTL 2	Understand	2
18	What is the significance of AVR in transformers?	BTL 2	Understand	2
19	How do energy-efficient motors contribute to cost savings?	BTL 2	Understand	2
20	What are the benefits of using soft starters with energy savers in motors?	BTL 2	Understand	2

PART B (13 Marks)

1.	Discuss the main losses in induction motors and how they can be minimized to improve efficiency.	BTL4	Analyze	2
2.	Explain the concept of variable speed drives (VSDs) and their role in improving energy efficiency in motor operations.	BTL 5	Analyze	2
3.	Describe the energy audit procedures for induction motors and how they differ from standard motor audits.	BTL 4	Analyse	2
4.	How can the selection of energy-efficient transformers contribute to overall energy savings in industrial operations?	BTL4	Analyze	2
5.	Explain the concept of soft starters with energy savers and how they can improve the efficiency of motor operations.	BTL4	Analyze	2
6.	Discuss the role of AVR and OLTC concepts in transformers and their impact on energy efficiency.	BTL4	Analyze	2
7.	Explain the concept of energy audit procedures in induction motors and its drives. What are the energy saving opportunities with energy-efficient motors?	BTL4	Analyze	2
8	Discuss the main losses in induction motors and how they can be minimized to improve efficiency.	BTL4	Analyze	2

PART-C(15 Marks)				
1	Evaluate motor and transformer efficiency in a production facility for energy optimization.	BT4	Analyze	2
2	Implement VSDs in motors and analyze energy savings in a pumping system.	BT4	Analyze	2

UNIT 3: ENERGY AUDIT IN FAN, BLOWERS, AND PUMPS

Fans and blowers: Types - efficient system operation - flow control strategies - energy audit procedures for fans and blowers - Pumps and Pumping System: Types - system operation - flow control methods - energy audit procedures in pumps.

PART A (2 Marks)

Q.No	Questions	BT Level	Competence	CO
1.	What are the types of fans?	BTL 1	Remember	3
2.	What are the types of blowers?	BTL 1	Remember	3
3.	What constitutes efficient fan system operation?	BTL1	Remember	3
4.	Describe flow control strategies for fans.	BTL 3	Analysis	3
5.	What are the energy audit procedures for fans?	BTL 2	Understand	3
6	What are the types of pumps?	BTL 1	Remember	3
7.	Explain the system operation of pumps.	BTL 3	Analysis	3
8.	What are the flow control methods for pumps?	BTL 2	Understand	3
9.	Describe the energy audit procedures for pumps.	BTL 3	Analysis	3
10.	What is the role of VSDs in fan and blower systems?	BTL 2	Understand	3
11	How do inlet vanes control fan flow?	BTL 2	Understand	3
12	What are the benefits of regular maintenance for fans and blowers?	BTL 2	Understand	3
13	How do you identify energy-saving opportunities in pumping systems?	BTL 2	Understand	3
14	What is throttling in pump flow control?	BTL 3	Analysis	3
15	What are the advantages of using VSDs in pumping systems?	BTL 2	Understand	3

16	How does bypass control work in pump systems?	BTL 2	Understand	3
17	What are positive displacement pumps?	BTL 2	Understand	3
18	How do centrifugal pumps operate?	BTL 2	Understand	3
19	Why is system design important in energy-efficient pump operation?	BTL 2	Understand	3
20	What is fan cycling in flow control?	BTL 2	Understand	3

PART B (13 Mark)

1.	Describe the types of fans and blowers commonly used in industrial applications and their energy efficiency characteristics.	BTL 4	Analyse	3
2.	Discuss the importance of efficient system operation in fans and blowers and strategies for achieving it.	BTL 4	Analyse	3
3.	Explain the various flow control strategies for fans and their impact on energy consumption.	BTL 4	Analyse	3
4.	Describe the energy audit procedures for fans and blowers and how they can help identify energy-saving opportunities.	BTL 4	Analyze	3
5.	Discuss the types of pumps used in industrial applications and their energy efficiency characteristics.	BTL4	Analyze	3
6.	Explain the energy audit procedures for pumps and pumping systems and how they can help improve energy efficiency.	BTL4	Analyze	3
7	Describe the types of pumps and pumping systems. How can energy audit procedures be implemented in pumps?	BTL4	Analyze	3
8	Explain the flow control methods in pumps and their impact on energy efficiency.	BTL4	Analyze	3
PART-C(15 Mark)				
1	Assess fan and blower operations in a ventilation system for energy efficiency improvements.	BTL4	Analyze	3

2	Develop a Audit procedure for a pump systems in a water treatment plant for energy conservation measures.	BTL4	Analyze	3
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UNIT 4: ENERGY AUDIT IN LIGHTING SYSTEMS

Lighting System: Light source, choice of lighting, luminance requirements – ballast - occupancy sensors - energy efficient lighting controls - energy conservation case Studies.

PART A (2 Marks)

Q.No	Questions	BT Level	Competence	CO
1.	What is a light source in a lighting system?	BTL 1	Remember	4
2.	How do you choose appropriate lighting for a space?	BTL 2	Understand	4
3.	What are luminance requirements?	BTL 2	Understand	4
4	What is the function of a ballast in a lighting system?	BTL 2	Understand	4
5	How do occupancy sensors contribute to energy efficiency?	BTL 2	Understand	4
6	What are energy-efficient lighting controls?	BTL 2	Understand	4
7	Can you provide an example of an energy conservation case study in lighting systems?	BTL 2	Understand	4
8	Why is LED lighting considered energy efficient?	BTL 2	Understand	4
9	What is the role of daylight sensors in lighting systems?	BTL 2	Understand	4
10	How do dimmers enhance energy efficiency in lighting systems?	BTL 2	Understand	4
11	What is the impact of proper lighting design on energy consumption?	BTL 2	Understand	4
12	How do lighting audits identify energy-saving opportunities?	BTL 2	Understand	4
13	What are the benefits of using fluorescent lighting?	BTL 2	Understand	4
14	How do lighting controls contribute to smart building systems?	BTL 2	Understand	4

15	What are the energy-saving advantages of using compact fluorescent lamps (CFLs)?	BTL 2	Understand	4
16	How do advanced lighting controls improve energy management?	BTL 2	Understand	4
17	What factors should be considered in a lighting retrofit project?	BTL 2	Understand	4
18	How can lighting audits contribute to sustainability goals?	BTL 2	Understand	4
19	What are the common challenges in implementing energy-efficient lighting systems?	BTL 2	Understand	4
20	Why is it important to consider the total cost of ownership in lighting systems?	BTL 2	Understand	4

PART B (13 Marks)

1.	Discuss the importance of lighting system audits in improving energy efficiency in industrial and commercial buildings.	BTL 4	Analyse	4
2.	Describe the different types of lighting systems and their energy efficiency characteristics.	BTL 4	Analyse	4
3.	Explain the role of occupancy sensors in energy-efficient lighting control and their impact on energy savings.	BTL4	Analyse	4
4.	Discuss the benefits of energy-efficient lighting controls and how they can be implemented in industrial settings.	BTL 4	Analyse	4
5.	Describe the energy conservation case studies in lighting systems and their impact on overall energy savings.	BTL 4	Analyse	4
6.	Explain the concept of ballast in a lighting system and its role in energy efficiency.	BTL 4	Analyse	4
7	Discuss the importance of ballasts in lighting systems. How do occupancy sensors contribute to energy conservation?	BTL 4	Analyse	4
8	Explain the concept of energy-efficient lighting controls. Provide examples of energy conservation case studies in lighting systems.	BTL 4	Analyse	4

PART-C(15 Marks)				
1.	Suggest the ways to retrofit lighting fixtures in a commercial office to reduce energy consumption and improve lighting quality.	BTL 4	Analyse	4
2	How to install occupancy sensors in a warehouse to optimize lighting usage and reduce energy waste.	BTL 4	Analyse	4

UNIT 5: ENVIRONMENTAL MANAGEMENT

Carbon Foot prints, Climate change and Global warming, Solar energy options for industries - clean development mechanism - Environmental management in industries - Future cleaner energy options

PART-A (2Marks)

Q. No	Questions	BT Level	Competence	CO
1.	What is a carbon footprint?	BTL 1	Remember	5
2.	What is climate change, and how does it relate to global warming?	BTL 2	Understand	5
3.	What are the solar energy options available for industries?	BTL 2	Understand	5
4.	Explain the clean development mechanism (CDM).	BTL 3	Understand	5
5.	How can industries implement environmental management practices?	BTL 2	Understand	5
6.	What are some future cleaner energy options for industries?	BTL 2	Understand	5
7.	What are the key components of a carbon footprint?	BTL 2	Understand	5
8	How does climate change impact the environment?	BTL 2	Understand	5
9	What are the benefits of solar energy for industries?	BTL 2	Understand	5

10	What are the principles of environmental management in industries?	BTL 2	Understand	5
11	How does the CDM promote sustainable development?	BTL 2	Understand	5
12	What are the challenges of implementing environmental management in industries?	BTL 2	Understand	5
13	How can industries reduce their carbon footprint?	BTL 2	Understand	5
14	What are the consequences of global warming?	BTL 2	Understand	5
15	What are the advantages of solar energy over conventional energy sources?	BTL 2	Understand	5
16	How can industries integrate environmental management into their operations?	BTL 2	Understand	5
17	What role does government policy play in promoting cleaner energy options?	BTL 2	Understand	5
18	What are the benefits of adopting environmental management practices in industries?	BTL 2	Understand	5
19	What are some innovative technologies for reducing carbon emissions?	BTL 2	Understand	5
20	How can industries contribute to global efforts to mitigate climate change?	BTL 2	Understand	5
PART B (13 Marks)				
1	Discuss the concept of carbon footprints and their impact on global climate change.	BTL 4	Analyse	5
2	Explain the relationship between carbon footprints, climate change, and global warming.	BTL 4	Analyse	5
3	Describe the solar energy options available for industries and their potential for reducing carbon footprints.	BTL 4	Analyse	5
4	Discuss the clean development mechanism (CDM) and its role in promoting environmental management in industries.	BTL 4	Analyse	5

5	Explain the concept of environmental management in industries and its importance in sustainable development.	BTL 4	Analyse	5
6	Discuss future cleaner energy options for industries and their potential for reducing carbon footprints.	BTL 4	Analyse	5
7	Describe the solar energy options available for industries. How can industries benefit from the clean development mechanism?	BTL 4	Analyse	5
8	Explain the concept of environmental management in industries. What are the key considerations for implementing future cleaner energy options?	BTL 4	Analyse	5
PART-C(15 Marks)				
1	Implement a solar energy system in an industrial facility to reduce carbon emissions and energy costs.	BTL 4	Analyse	5
2	Develop an environmental management plan for a manufacturing plant to achieve sustainability goals.	BTL 4	Analyse	5