SRM VALLIAMMAI ENGINEERING COLLEGE

(Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

VIII SEMESTER

1905807- Energy Management and Auditing

(Regulation – 2019)

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Even Semester

Prepared by

Mr. S. Balaji, Assistant Professor (Sr. G)/EEE

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

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SUBJECT & SUBJECT CODE: 1905807- ENERGY MANAGEMENT AND AUDITING
SEM / YEAR: VIII / IV

UNIT-I INTRODUCTION				
Basics of Energy – Need for energy management – Energy accounting - Energy monitoring, targeting and reporting - Energy audit process.				
PART-A				
Q. No	**Questions**	**BT Level**	**Competence**	**CO**
1.	What is the need of energy management?	BTL1	Remembering	CO1
2.	What is energy targeting?	BTL2	Understanding	CO1
3.	Interpret cogeneration.	BTL1	Remembering	CO1
4.	Define energy audit.	BTL2	Understanding	CO1
5.	Demonstrate the objectives of energy management.	BTL3	Applying	CO1
6.	Summarize about energy monitoring.	BTL3	Applying	CO1
7.	List out various types of energy available.	BTL1	Remembering	CO1
8.	Illustrate energy accounting.	BTL5	Evaluating	CO1
9.	Analyze the objectives of the energy management program.	BTL2	Understanding	CO1
10.	Evaluate the need for energy management.	BTL4	Analyzing	CO1
11.	List the basics of energy.	BTL1	Remembering	CO1
12.	Demonstrate the essential elements of energy monitoring and reporting.	BTL4	Analyzing	CO1
13.	Justify the components of the energy management program to ensure the success.	BTL2	Understanding	CO1
14.	Distinguish between monitoring and targeting.	BTL4	Analyzing	CO1
15.	Evaluate parts of energy monitoring.	BTL3	Applying	CO1
16.	List the benefits of monitoring and targeting system.	BTL1	Remembering	CO1
17.	What is the major source of electrical power generation in India?	BTL1	Remembering	CO1
18.	Compose the energy intensity ratio.	BTL6	Creating	CO1
19.	Prepare the need of energy audit.	BTL6	Creating	CO1

20.	Analyze various energy audit methods.		BTL5	Evaluating	CO1
21.	Define energy intensity.		BTL1	Remembering	CO1
22.	List the four steps of an energy audit.		BTL2	Understanding	CO1
23.	Articulate the major source of electrical power generation in India.		BTL3	Applying	CO1
24.	Analyze the meaning of energy monitoring how it is achieved.		BTL4	Analyzing	CO1
PART-B					
1.	Describe about energy audit process.	(13)	BTL1	Remembering	CO1
2.	Examine the different phase of energy auditing methodology	(13)	BTL2	Understanding	CO1
3.	Demonstrate the methods of energy monitoring.	(13)	BTL3	Applying	CO1
4.	Describe the basics of energy.	(13)	BTL2	Understanding	CO1
5.	Evaluate the methods energy accounting.	(13)	BTL1	Remembering	CO1
6.	Formulate the types of energy monitoring.	(13)	BTL3	Applying	CO1
7.	Examine the essentials of energy.	(13)	BTL4	Analyzing	CO1
8.	Examine the categories of energy accounting.	(13)	BTL1	Remembering	CO1
9.	Analyze the difference between monitoring and targeting in detail	(13)	BTL2	Understanding	CO1
10.	Explain energy conservation and its importance.	(13)	BTL1	Remembering	CO1
11.	Explain the parts of energy monitoring.	(13)	BTL4	Analyzing	CO1
12.	Examine the benefits of monitoring and targeting system and explain in detail.	(13)	BTL3	Applying	CO1
13.	Summarize the need for energy management.	(13)	BTL5	Evaluating	CO1
14.	Demonstrate main source of energy and its types.	(13)	BTL6	Creating	CO1
15.	What is energy conservation? Articulate its importance.	(13)	BTL1	Remembering	CO1
16.	Define energy monitoring, energy targeting and explain how it is achieved	(13)	BTL2	Understanding	CO1
17.	Articulate about PPP.	(13)	BTL3	Applying	CO1
PART-C					
1.	Evaluate the methodologies for detailed energy audit process.	(15)	BTL5	Evaluating	CO1
2.	Summarize the need and importance for energy management.	(15)	BTL5	Evaluating	CO1
3.	Integrate the process of energy auditing.	(15)	BTL6	Creating	CO1

4.	Design the importance of energy monitoring	(15)	BTL6	Creating	CO1
5.	Analyze the difference between energy conservation and energy efficiency with a suitable example.	(15)	BTL4	Analyzing	CO1

UNIT-II ENERGY MANAGEMENT FOR MOTORS AND COGENERATION

Energy management for electric motors – Transformer and reactors - Capacitors and synchronous machines, energy management by cogeneration – Forms of cogeneration – Feasibility of cogeneration – Electrical interconnection.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	List the effects of capacitors in energy management.	BTL1	Remembering	CO2
2.	List the various factors to be considered for electric motors.	BTL2	Understanding	CO2
3.	List the need for current transformers.	BTL1	Remembering	CO2
4.	Describe about energy efficient motors	BTL2	Understanding	CO2
5.	Interpret few energy management possibilities in transformers.	BTL3	Applying	CO2
6.	How can we conserve energy in motor?	BTL3	Applying	CO2
7.	Analyze the energy management techniques.	BTL1	Remembering	CO2
8.	Show the need for energy management.	BTL5	Evaluating	CO2
9.	List the three parts of energy management.	BTL2	Understanding	CO2
10.	Analyze the two forms of energy are usually produced in a cogeneration process.	BTL4	Analyzing	CO2
11.	Tell the other name of cogeneration.	BTL1	Remembering	CO2
12.	Show the need of cogeneration.	BTL4	Analyzing	CO2
13.	List the advantages of cogeneration.	BTL2	Understanding	CO2
14.	Compose the disadvantages of cogeneration.	BTL4	Analyzing	CO2
15.	Illustrate the applications of cogeneration.	BTL3	Applying	CO2
16.	Analyze the need of electrical interconnection.	BTL1	Remembering	CO2
17.	Decide which device is required for the electrical interconnection.	BTL1	Remembering	CO2
18.	Evaluate how electric motors can be used in an energy efficient manner.	BTL6	Creating	CO2
19.	Compose the types of energy efficient motors.	BTL6	Creating	CO2
20.	Describe an example of electrical interconnection.	BTL5	Evaluating	CO2
21.	What are the four main elements of energy management?	BTL1	Remembering	CO2
22.	Infer the schematic view of steam turbine cogeneration	BTL2	Understanding	CO2

	systems.				
23.	Articulate the schematic view of gas turbine cogeneration systems.		BTL3	Applying	CO2
24.	Analyze the schematic view of reciprocating engine cogeneration Systems		BTL4	Analyzing	CO2
	PART-B				
1.	Examine synchronous machine control and energy management in detail.	(13)	BTL1	Remembering	CO2
2.	Analyze various factors to be considered while selecting a motor.	(13)	BTL2	Understanding	CO2
3.	List and explain the various steps in energy management for transformers.	(13)	BTL3	Applying	CO2
4.	Analyze the functions of capacitors in energy management in brief.	(13)	BTL2	Understanding	CO2
5.	Evaluate the need of reactors in energy management	(13)	BTL1	Remembering	CO2
6.	Summarize energy management in motor systems.	(13)	BTL3	Applying	CO2
7.	Define the importance of transformers in energy management in detail	(13)	BTL4	Analyzing	CO2
8.	Summarize the need of transformers in energy management in detail	(13)	BTL1	Remembering	CO2
9.	Demonstrate the forms of cogeneration.	(13)	BTL2	Understanding	CO2
10.	Integrate the features of cogeneration.	(13)	BTL1	Remembering	CO2
11.	Quote the feasibility of cogeneration.	(13)	BTL4	Analyzing	CO2
12.	Briefly analyze the objectives of reactors in energy management.	(13)	BTL3	Applying	CO2
13.	Compose the need and importance of energy management for electric motors.	(13)	BTL5	Evaluating	CO2
14.	Evaluate the various functions of reactors in energy management.	(13)	BTL6	Creating	CO2
15.	Explain gas turbine cogeneration systems.	(13)	BTL1	Remembering	CO2
16.	Interpret in detail about reciprocating engine cogeneration Systems	(13)	BTL2	Understanding	CO2
17.	Factors Influencing Cogeneration Choice-Articulate.	(13)	BTL3	Applying	CO2

PART-C					
1.	Evaluate the importance of synchronous machines in energy management.	(15)	BTL5	Evaluating	CO2
2.	Evaluate the various steps in energy management by cogeneration.	(15)	BTL5	Evaluating	CO2
3.	Compose the principles of cogeneration	(15)	BTL6	Creating	CO2
4.	Prepare a note on electrical interconnection.	(15)	BTL6	Creating	CO2
5.	Analyze the Factors Influencing Cogeneration.	(15)	BTL4	Analyzing	CO2

UNIT-III LIGHTING SYSTEMS

Energy management in lighting systems – Task and the working space - Light sources – Ballasts – Lighting controls – Optimizing lighting energy – Power factor and effect of harmonics, lighting and energy standards.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	List various lightning sources.	BTL1	Remembering	CO3
2.	Analyse harmonic distortion.	BTL2	Understanding	CO3
3.	Show how to ensure energy efficiency in lightning system.	BTL1	Remembering	CO3
4.	Analyze energy management in lighting system.	BTL2	Understanding	CO3
5.	List out the different Ways to save energy on lighting.	BTL3	Applying	CO3
6.	How do you ensure the efficiency and Optimize the energy consumption of the lighting system?	BTL3	Applying	CO3
7.	List the different methods of lighting energy.	BTL1	Remembering	CO3
8.	Predict the most energy efficient lighting.	BTL5	Evaluating	CO3
9.	Illustrate the use of task lighting	BTL2	Understanding	CO3
10.	Define the lighting levels in a workplace be.	BTL4	Analyzing	CO3
11.	Describe what type of lighting is task lighting.	BTL1	Remembering	CO3
12.	Discriminate the sources of light.	BTL4	Analyzing	CO3
13.	Analyze the meaning of source of light.	BTL2	Understanding	CO3
14.	Describe natural source of light.	BTL4	Analyzing	CO3
15.	Compose various artificial source of light.	BTL3	Applying	CO3
16.	Evaluate various lighting control options to support the vision of lighting arrangement.	BTL1	Remembering	CO3
17.	Describe the meaning of lighting control.	BTL1	Remembering	CO3
18.	Demonstrate parts of a lighting control system.	BTL6	Creating	CO3
19.	Define how do harmonics affect power factor.	BTL6	Creating	CO3
20.	Compose the reason. Does power factor Correction	BTL5	Evaluating	CO3

	reduce harmonics?				
21.	Define Lux.		BTL1	Remembering	CO3
22.	Interpret the different types of lamps.		BTL2	Understanding	CO3
23.	What do the following terms mean? – Illuminance – Luminous efficacy		BTL3	Applying	CO3
24.	Analyse short note on Luminaire and Control gear.		BTL4	Analyzing	CO3
	PART-B				
1.	Demonstrate various steps involved in design of lightning system & also explain how optimizing lighting energy is done.	(13)	BTL1	Remembering	CO3
2.	Discover the various types of light sources & discuss about its luminous performance characteristics.	(13)	BTL2	Understanding	CO3
3.	Quote the various measures for energy efficient and economic use of lighting.	(13)	BTL3	Applying	CO3
4.	Describe the effect of power factor & harmonics.	(13)	BTL2	Understanding	CO3
5.	Describe the functions of lightning sources.	(13)	BTL1	Remembering	CO3
6.	Explain how optimizing lighting energy is done.	(13)	BTL3	Applying	CO3
7.	List the various energy efficiency improvement opportunities in lightning system.	(13)	BTL4	Analyzing	CO3
8.	Analyze the different procedure involved in design of lightning system.	(13)	BTL1	Remembering	CO3
9.	Analyze the steps involved in optimizing lighting energy.	(13)	BTL2	Understanding	CO3
10.	Tell the effect of lightning and energy standards.	(13)	BTL1	Remembering	CO3
11.	Tabulate the effect of power factor and harmonics.	(13)	BTL4	Analyzing	CO3
12.	Analyze the opportunities for energy efficient lighting.	(13)	BTL3	Applying	CO3
13.	Discriminate the different types of ballast.	(13)	BTL5	Evaluating	CO3
14.	Integrate the function of electronic ballast.	(13)	BTL6	Creating	CO3
15.	List the energy savings opportunities in industrial lighting systems.	(13)	BTL1	Remembering	CO3
16.	Briefly describe the methodology of lighting energy audit in an industrial facility?	(13)	BTL2	Understanding	CO3

17.	Explain briefly about various lighting controls available?	(13)	BTL3	Applying	CO3
PART-C					
1.	Compose a record of task and working space in lightning system.	(15)	BTL5	Evaluating	CO3
2.	Discriminate the purpose of lighting control.	(15)	BTL5	Evaluating	CO3
3.	Explain about lightning and energy standards.	(15)	BTL6	Creating	CO3
4.	Prepare the functions of optimizing light energy.	(15)	BTL6	Creating	CO3
5.	Describe the methodology of lighting energy audit in an industrial facility?	(15)	BTL4	Analyzing	CO3
UNIT-IV METERING FOR ENERGY MANAGEMENT					
	Metering for energy management – Units of measure - Utility meters – Demand meters – Paralleling of current transformers – Instrument transformer burdens – Multi tasking solid state meters, metering location vs requirements, metering techniques and practical examples.				
PART-A					
Q. No	**Questions**		**BT Level**	**Competence**	**CO**
1.	Define demand meter.		BTL1	Remembering	CO4
2.	List various factors to be considered for paralleling of current transformer.		BTL2	Understanding	CO4
3.	Describe smart metering.		BTL1	Remembering	CO4
4.	Demonstrate metering in energy.		BTL2	Understanding	CO4
5.	Differentiate energy metering and monitoring.		BTL3	Applying	CO4
6.	Discriminate the functions of utility meter.		BTL3	Applying	CO4
7.	How do you read a utility meter?		BTL1	Remembering	CO4
8.	What is unit in electric meter reading?		BTL5	Evaluating	CO4
9.	Describe how electric demand is measured.		BTL2	Understanding	CO4
10.	Interpret demand reading in electricity meter.		BTL4	Analyzing	CO4
11.	Illustrate the difference between energy consumption and demand.		BTL1	Remembering	CO4
12.	Compare kilowatt demand meter from typical usage meter like a kilowatt hour meter.		BTL4	Analyzing	CO4
13.	How do you evaluate maximum demand per kWh?		BTL2	Understanding	CO4
14.	Compose the need for paralleling of current transformers.		BTL4	Analyzing	CO4
15.	Identify what happens when two transformers are connected in parallel.		BTL3	Applying	CO4

16.	List the advantage of parallel operation of transformers.		BTL1	Remembering	CO4
17.	Discuss the points to select a current transformer for metering.		BTL1	Remembering	CO4
18.	Demonstrate burden of current transformer.		BTL6	Creating	CO4
19.	Explain burden in instrument transformer.		BTL6	Creating	CO4
20.	Compose the errors occurs in instrument transformers.		BTL5	Evaluating	CO4
21.	State the scope of energy audit.		BTL1	Remembering	CO4
22.	List the minimum requirements of energy metering.		BTL2	Understanding	CO4
23.	Articulate pressure correction factor.		BTL3	Applying	CO4
24.	Analyze steam metering.		BTL4	Analyzing	CO4
PART-B					
1.	Describe about various cost factors associated with metering.	(13)	BTL1	Remembering	CO4
2.	Examine the need of following with respect to energy management a. Utility meters b. Demand meters	(13)	BTL2	Understanding	CO4
3.	Summarize the need of paralleling of CT with respect to energy management.	(13)	BTL3	Applying	CO4
4.	Illustrate multi tasking solid state meters in energy management.	(13)	BTL2	Understanding	CO4
5.	Discover the importance of metering location and requirements in energy management.	(13)	BTL1	Remembering	CO4
6.	Analyze the best practices of metering techniques with example	(13)	BTL3	Applying	CO4
7.	Examine the role of the Smart meters in the energy management systems.	(13)	BTL4	Analyzing	CO4
8.	Summarize the need, importance and objectives of demand meters.	(13)	BTL1	Remembering	CO4
9.	Summarize different cost factors associated with metering in detail.	(13)	BTL2	Understanding	CO4
10.	Describe the need of paralleling of current transformer with respect to energy management.	(13)	BTL1	Remembering	CO4
11.	Express multi tasking solid state meters in energy management.	(13)	BTL4	Analyzing	CO4
12.	Discover about linking meters to monitoring systems.	(13)	BTL3	Applying	CO4
13.	Analyze the importance of metering location an requirements in energy management.	(13)	BTL5	Evaluating	CO4

14.	Integrate metering techniques and practical examples.	(13)	BTL6	Creating	CO4
15.	What types of metering to use explain in practical considerations?	(13)	BTL1	Remembering	CO4
16.	Interpret about linking meters to monitoring systems.	(13)	BTL2	Understanding	CO4
17.	Discover the need of Utility meters.	(13)	BTL3	Applying	CO4
PART-C					
1.	Discriminate metering for energy management.	(15)	BTL5	Evaluating	CO4
2.	Compose the importance of metering location and requirements in energy management.	(15)	BTL5	Evaluating	CO4
3.	Summarize Instrument transformer burdens	(15)	BTL6	Creating	CO4
4.	Compose the steps involved in metering for energy management.	(15)	BTL6	Creating	CO4
5.	Analyze types of metering and uses in practical considerations.	(15)	BTL4	Analyzing	CO4
UNIT-V ECONOMIC ANALYSIS AND MODELS					
Economic analysis – Economic models - Time value of money - Utility rate structures – Cost of electricity – Loss evaluation, load management – Demand control techniques – Utility monitoring and control system – HVAC and energy management – Economic justification.					
PART-A					
Q. No	**Questions**		**BT Level**	**Competence**	**CO**
1.	Examine the time value of money.		BTL1	Remembering	CO5
2.	Describe the economic model of energy.		BTL2	Understanding	CO5
3.	Demonstrate the advantages of load management.		BTL1	Remembering	CO5
4.	Analyze the types of economic models.		BTL2	Understanding	CO5
5.	Define energy cost		BTL3	Applying	CO5
6.	Describe the time value of money.		BTL3	Applying	CO5
7.	Demonstrate the disadvantages of load management.		BTL1	Remembering	CO5
8.	Compose the role of models in economic analysis.		BTL5	Evaluating	CO5
9.	Point out some examples of economic models.		BTL2	Understanding	CO5
10.	How do you make an economic model?		BTL4	Analyzing	CO5
11.	Describe the characteristics of economic model.		BTL1	Remembering	CO5
12.	Analyse basic parts of the time value of money		BTL4	Analyzing	CO5
13.	List elements of time value of money		BTL2	Understanding	CO5
14.	Describe the rate structure.		BTL4	Analyzing	CO5
15.	Demonstrate how to calculate electrical energy loss.		BTL3	Applying	CO5

16.	List purposes for economic models.		BTL1	Remembering	CO5
17.	Explain how you calculate power loss in an AC circuit.		BTL1	Remembering	CO5
18.	Compose the elements of time value of money.		BTL6	Creating	CO5
19.	List the basic parts of the time value of money.		BTL6	Creating	CO5
20.	Explain rate structure.		BTL5	Evaluating	CO5
21.	State simple pay back period.		BTL1	Remembering	CO5
22.	Give the relationship between present and future value.		BTL2	Understanding	CO5
23.	Articulate return on investment.		BTL3	Applying	CO5
24.	Analyze net present value.		BTL4	Analyzing	CO5
PART-B					
1.	Collect the different aspects of load management.	(13)	BTL1	Remembering	CO5
2.	Illustrate about the various demand control possibilities to a load management	(13)	BTL2	Understanding	CO5
3.	Compose the different cost factors involved in metering.	(13)	BTL3	Applying	CO5
4.	Identify various demand control techniques.	(13)	BTL2	Understanding	CO5
5.	Illustrate Economic justification.	(13)	BTL1	Remembering	CO5
6.	Describe the demand control techniques.	(13)	BTL3	Applying	CO5
7.	Explain the different aspects of load management.	(13)	BTL4	Analyzing	CO5
8.	Examine HVAC and energy management.	(13)	BTL1	Remembering	CO5
9.	Summarize about possibilities of demand control to a load management.	(13)	BTL2	Understanding	CO5
10.	Infer demand side management scheme.	(13)	BTL1	Remembering	CO5
11.	Describe various cost factors involved in metering	(13)	BTL4	Analyzing	CO5
12.	Analyse the steps involved in cost of electricity.	(13)	BTL3	Applying	CO5
13.	Examine different aspects of load management.	(13)	BTL5	Evaluating	CO5
14.	Analyze different demand control techniques.	(13)	BTL6	Creating	CO5
15.	Explain demand side management scheme.	(13)	BTL1	Remembering	CO5
16.	Describe about implementation of energy efficiency projects.	(13)	BTL2	Understanding	CO5
17.	Compose details of utility monitoring and control system.	(13)	BTL3	Applying	CO5
PART-C					
1.	Explain HVAC and energy management.	(15)	BTL5	Evaluating	CO5
2.	Compose details about economic models.	(15)	BTL5	Evaluating	CO5
3.	Explain Economic justification.	(15)	BTL6	Creating	CO5
4.	Compose the different methods of economic	(15)	BTL6	Creating	CO5

	analysis in detail.				
5.	Analyze about implementation of energy efficiency projects.	(15)	BTL4	Analyzing	CO5

Course Outcome:

- Engineering students will have the ability to understand the basics of Energy audit process.
- Students will have an ability to understand the basics of energy management by cogeneration.
- Students will be able to acquire knowledge on Energy management in lighting systems
- Students will be able to impact concepts behind economic analysis and Load management.
- Students will have understanding on the importance of Energy management on various electrical equipment and metering and ability to acquire knowledge on HVAC.