

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019**

**Course Code: EE474**

**Course Name: ENERGY MANAGEMENT AND AUDITING**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

Marks

- |   |  |     |
|---|--|-----|
| 1 | List down the general principles of energy management  | (5) |
| 2 | Explain any five energy management opportunities in lighting systems   | (5) |
| 3 | What is a boiler system? What are the major components of a boiler system?   | (5) |
| 4 | How capacity of an HVAC system is mentioned? What is meant by coefficient of performance?  | (5) |
| 5 | What is meant by energy audit? Enumerate the differences between preliminary and detailed energy audits  | (5) |
| 6 | What is meant by cogeneration and lists its advantages?  | (5) |
| 7 | What is meant by life cycle costing? List down the factors considered for finding the life cycle costing of an air conditioning system.  | (5) |
| 8 | A project entails an investment for initial cost of installation and series of annual costs and/or cost savings throughout the life of project. Recommend a suitable financial analysis technique and explain. | (5) |

**PART B**

*Answer any two full questions, each carries 10 marks.*

- |    |   |      |
|----|---|------|
| 9  | Define Energy Management. Explain the various steps involved in energy management planning?   | (10) |
| 10 | a) Enumerate the peak demand control methodologies used in energy management planning   | (5)  |
|    | b) Explain the types of losses in an electric motor. List down the various opportunities for energy saving in case of under-loaded motors   | (5)  |
| 11 | An energy audit was conducted in the draft fan motor of a boiler system. The motor is rated for 37 kW, 415V, 72A, 0.88pf. Using electrical power analyser, the operating values are found to be 410V, 50A, 0.73 pf<br>The energy audit team proposed to replace the existing motor by a 30kW energy efficient eff3 motor with 90% efficiency. | (10) |

- a) Determine the rated efficiency and the loading of the existing motor.  
 b) Calculate the loading with energy efficient motor  
 c) Calculate kW saved by replacing the motor with new eff3 motor  
 Consider motor efficiency to remain constant between 52 –100 % loading.

**PART C**

*Answer any two full questions, each carries 10 marks.*

- 12 What is meant by boiler blow down? Explain the types of blow down processes in boiler system? (10)
- 13 a) List any five methods of energy conservation opportunities in a furnace? (5)  
 b) List the main components of a vapour compression refrigeration system with figure? (5)
- 14 What are advantages of installing waste heat recovery devices? Explain any two waste heat recovery devices. (10)

**PART D**

*Answer any two full questions, each carries 10 marks.*

- 15 Explain in detail the steps involved in detailed energy audit (10)
- 16 a) List any five instruments used for energy audit. What are the parameters that can be measured using electric power analyser? (5)  
 b) Explain any two economic analysis techniques used for financial evaluation of energy conservation projects? (5)
- 17 The cash flow of an energy saving project with a capital investment cost of Rs. 30,000/- is given in the table below. Find the NPV of the project at a discount rate of 10%. Also find the Internal Rate of Return of the project. (10)

Year	Cash Flow
1	7000
2	7000
3	7000
4	7000
5	7000
6	7000

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Eighth semester B.Tech degree examinations, September 2020

**Course Code: EE474****Course Name: ENERGY MANAGEMENT AND AUDITING**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 5 marks.*

Marks

- |   |   |     |
|---|---|-----|
| 1 | Define energy management. Discuss the significance of electrical load management.       | (5) |
| 2 | Enumerate the features of energy efficient motors.                                      | (5) |
| 3 | Illustrate blow down process in boilers.  | (5) |
| 4 | Comment on waste heat recovery devices.   | (5) |
| 5 | Discuss on any two energy audit instruments.  | (5) |
| 6 | Mention the principle of cogeneration system.   | (5) |
| 7 | Discuss net present value (NPV) method of evaluating economic feasibility of a project. | (5) |
| 8 | Explain cash flow diagram.  | (5) |

**PART B***Answer any two full questions, each carries 10 marks.*

- |    |  |      |
|----|--|------|
| 9  | Explain various peak demand control methodologies.   | (10) |
| 10 | a) Mention the significance of optimal load scheduling   | (5)  |
|    | b) Enlist various energy saving opportunities in electrolytic process  | (5)  |
| 11 | a) A 50kW induction motor with 86 % present full load efficiency is being considered for replacement by a 89 % efficiency motor. What will be the savings in energy if the motor works for 6000 hours per year and cost of energy is Rs. 4.50 per kWh? | (5)  |
|    | b) Discuss any five energy saving methods used in lighting system.   | (5)  |

**PART C***Answer any two full questions, each carries 10 marks.*

- |    |  |      |
|----|--|------|
| 12 | Enumerate various energy saving opportunities in steam distribution system.                                      | (10) |
| 13 | a) Discuss any five energy saving methods in furnaces.   | (5)  |
|    | b) Mention the different types and benefits of waste heat recovery system.                                       | (5)  |
| 14 | Define COP of an HVAC system. With the help of a neat schematic explain vapour compression refrigeration system. | (10) |

**PART D**

*Answer any two full questions, each carries 10 marks.*

- 15 Discuss in detail on 10 step methodology in detailed energy auditing. (10)
- 16 a) What are the various factors influencing cogeneration choice? (5)
- b) Write a note on IRR method. (5)
- 17 A proposed project requires a capital investment of Rs 20000. The cash flow generated by the project are as shown in the table below. (10)

<b>Year</b>	<b>Cash flow</b>
0	-20000
1	+6000
2	+5500
3	+5000
4	+4500
5	+4000
6	+4000

Calculate the internal rate of return of the project. Assume initial value of  $i$  to be 8%

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