



KIBABII UNIVERSITY

2020/2021 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER

MAIN EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE ENERGY AND
BIOFUELS TECHNOLOGY

COURSE CODE: IET 425

COURSE TITLE: ENERGY AUDITING

DATE: 7/10/2021

TIME: 2:00-4:00PM

INSTRUCTIONS TO CANDIDATES

Answer question ONE and any other TWO questions

This paper consists of 4 printed pages. Please Turn over

SECTION ONE: ATTEMPT ALL QUESTIONS IN THIS SECTION;30 MARKS

QUESTION ONE

- a. Define the following terms:
 - I. Energy auditing (1mk)
 - II. Energy survey (1mk)
- b. Most organizations incur losses in their operations because of energy auditing. State any FOUR causes of energy losses in an organization (5mks)
- c. Energy Auditing is a tool for identifying energy efficiency potential and measures both in industries and organizations. Briefly state the significance of energy audit in industries (3mks)
- d. What do you understand by the term Electrical Load Management? (3mks)
Give any FOUR energy saving strategies in regard to electric motors: (4mks)
- e. Explain how Awareness Raising and Education can be used as energy saving strategy in industries. (3mks)
- f. State any FOUR levels in energy auditing (4mks)
- g. List any FOUR equipments used for taking measurements during industrial energy auditing. (4mks)
- h. Why is it important to calculate demand profiles in energy management practices? Give two reasons. (2mks)

SECTION TWO: ATTEMPT ANY TWO QUESTIONS; 40 MARKS

QUESTION TWO

- a. The table below shows the average hourly energy consumption data for a typical day recorded at one of the lecture rooms at Kibabii University. Use it to answer the questions that follows:

Hour	Kw	Hour	kW	Hour	kW
1.00 am	45	9.00am	120	5.00pm	110
2.00am	47	10.00am	122	6.00pm	82
3.00am	43	11.00am	121	7.00pm	60
4.00am	46	12.00pm	100	8.00pm	61
5.00am	45	1.00pm	124	9.00pm	63
6.00am	62	2.00pm	135	10.00pm	61
7.00am	69	3.00pm	120	11.00pm	65
8.00am	95	4.00pm	123	12.00pm	50

- I. Draw the demand profile using the data in the table above (5mks).
 - II. Describe the nature of the nature of the demand profile drawn in (i) above (2mks)
 - III. Identify the peak and off peak demand from the demand profile drawn (2mks)
 - IV. List any THREE low cost measures that can be employed to reduce the peak power demand (3mks)
- b. Describe how audit can be carried out using the following techniques
- i. Home Energy Audit (3mks)
 - ii. Pollution audits (2mks)
 - iii. Infrared thermography audit (3mks)

QUESTION THREE

- a. Define the term energy index as used in Energy Audit (1mk)
- b. Consider a company using three energy forms oil, gas and electricity. The annual energy consumption is shown below in watt hours. If the company produces 100×10^3 tons of a particular product.

Energy Type	Energy in Wh
Oil	0.520X10 ⁹
Gas	0.146X10 ⁹
Electricity	1.661X10 ⁹

Calculate:

- 1) Percentage energy balance (3mks)
- 2) Energy indices (3mks)
- c. Discuss THREE types of energy audits used in energy management (6mks)
- d. Energy auditing aims at minimizing energy wastages. Briefly explain some of the causes of energy wastage. (7mks)

QUESTION FOUR

- a. As an energy manager at Kibabii university. You intend to carry out an energy auditing exercise in the vice chancellor's office. Step by step describe how you will carry out this exercise of energy auditing. (20mks)