



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL Of Engineering Technology

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

**SECOND YEAR SECOND SEMESTER EXAMINATION FOR BACHELOR
OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING**

**EET622: ENERGY AUDIT AND DEMAND AND ELECTRONIC
ENGINEERING**

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer Question one and any other two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

- a) Discuss Energy audit and the three main components of preliminary energy audit.
(7marks)
- b) A fruit juice manufacturing plant usually processes their products at a maximum temperature of hot water at 80°C. The firm uses hot water generated from steam show source is heavy oil. Discuss a better way that can be used to heat hot water instead of using steam. (7marks)
- c) Briefly discuss the operation of the following energy instruments. (6marks)
 - i. Anemometer
 - ii. Lux meter
 - iii. Infrared thermometer
- d) Employees as a part of the organizational structure are perhaps the greatest untapped resource in an energy management program. Describe the main reasons for the statement in energy management in Kenya Industries. (5marks)

SECTION TWO: ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 MARKS)

- a) Differentiate commercial and non-commercial sources of energy using two examples
(8marks)
- b) Discuss two objectives of energy management in an industrial setting (8marks)
- c) Briefly discuss the THREE examples of “turning off” in Energy management opportunities (6marks)
- d) Discuss the essence of energy audit of a thermal power plant and hence use an appropriate diagram to define energy losses in the plant that are given by Boiler losses 11%, cycle losses 44.7%, turbine losses 6.1% and station auxiliaries 2%
(5marks)

QUESTION THREE (20 MARKS)

- a) Given incandescent lamps and LED lamps, discuss energy conservation and energy efficiency in energy management of a lighting system then briefly discuss a typical example (10marks)
- b) An industry using 3 phase 7.5kw (10Hp)AC electric motors are decided to replace the motors with Energy Efficient motors for the purpose of Energy management. The motor properties of the existing and new motors are as follows

Motor properties	JLO Motor	Energy efficient motor
Output raxing	7.5kw	7.5kw
Efficiency	85%	91.7%
Initial cost	450 usd	993usd
Replacement life	8yrs (1689ch)	20years (422toh)
Salvage value	150 usd	330usd
Normal maintenance	1-usd	1—usd
Electricity cost	0.10usd/kwh	0.10usd/kh

Assuming electricity used by each motor is (8h/day) (22___/month) (12months/year)
e_____

- c) And using the date given for the two motors, determine the annual operating cost for each motor and show which motor is better in managing energy consumption per year. (15marks)

QUESTION FOUR (20 MARKS)

- a) Discuss THREE reasons why solar thermal is more effective and efficient than solar PV in management of renewable energy (6marks)
- b) Define Energy management and discuss any three practices that enable energy management in organizations (9marks)
- c) Most organizations have “islands” with major gaps between departmental function, methods, technologies and communication that restrict effective management of energy. “Discuss any two common reasons why many energy management projects fail.

