



KENYATTA UNIVERSITY

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENERGY TECHNOLOGY

TET 408: ENERGY MANAGEMENT

2ND SEMESTER 2022/2023

TIME: 2 HOURS

INSTRUCTIONS:

1. Do not write anything on this question paper
2. This paper contains **FIVE** questions
3. Question 1 carries **30 marks**, while the other questions carry **20 marks** each
4. Answer **question 1** and any other **TWO** questions of the given four questions.

QUESTION ONE

- i) Define the following terms as used in the energy management. (6 marks)
 - (a) Energy Management
 - (b) Energy Audit
 - (c) Utility demand side management
- ii) Outline and explain three needs of energy management in a processing facility. (6 marks)
- iii) Energy audits play a significant role in energy managements, to successfully carry out energy audits basic components of an energy audits needs to be taken into consideration. List and explain the components. (6 marks)
- iv) Summarize the components making up the electricity bill in Kenya. (4 marks)
- v) Explain the roles of energy manager in any facilities. (3 marks)
- vi) After a successful audit, a facility is advised to improve on their lighting to improve on their savings. The lighting improvement chosen by the facility will cost the facility \$1500 to install. With this improvement the facility will save \$500 each year. What is the simple payback period? (5 marks)

QUESTION TWO

- i) Discuss the benefits of energy efficiency. (8 marks)
- ii) Explain the needs of energy analysis in any facility. (4 marks)
- iii) Explain various energy efficiency opportunities in buildings. (8 marks)

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QUESTION THREE

- i) Outline at least 5 tools used in the energy audits and their use. (8 marks)
- ii) Energy action planning plays an important role in ensuring energy efficiency is obtained at the end of the day. To achieve this the energy information system is needed. Explain the importance of this energy information system in an energy facility. (12 marks)

QUESTION FOUR

- i) State and explain six steps in energy management. (6 marks)
- ii) An industrial plant makes 'widgets' and management forecast at 12% increase in annual production during 2018 over their production in 2017. The production (process) electricity is metered separately from the balance of the plant. Using the information below: (14 marks)
Every widget required 0.2875kWh of electricity (intensity), 2017 production volume =12,500,000 widgets, monthly electrical consumption unrelated to production = 224,373 kWh, Pro-rated electricity cost (demand and consumption) = \$0.075/kWh.
 - (a) What is the expected monthly electrical cost in 2018?
 - (b) What is the total electricity cost for each widget the plant produces in 2018?

QUESTION FIVE

- i) Discuss the 10 steps taken when carrying out a detailed energy audit. (10 marks)
- ii) Explain the five types of energy audits. (5 marks)
- iii) Explain the following terms. (5 marks)
 - (a) Energy Conservation Measure
 - (b) Simple payback period
 - (c) Time Value of Money
 - (d) Minimum Attractive Rate of Return
 - (e) Life Cycle Costing.