



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY**

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2020/2021 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

**BACHELOR OF SCIENCE IN RENEWABLE ENERGY
TECHNOLOGY**

COURSE CODE: RET 451

COURSE TITLE: ENERGY MANAGEMENT

DATE: 29-04-2022

TIME: 08:00-10:00

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory

Answer Question ONE and any other TWO questions

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over



Question 1 /30 marks/

(a) Explain three (3) major energy efficiency losses in steam generation and distribution systems in a factory [6 marks]

(b) A large office building receives service from its electric utility at the general service demand rate structure described below. The electric energy use and costs for this company for one month are:

- Energy consumption 150,000 kWh
- Metered Demand 550 kW

Calculate the cost of the electric bill for the month with the following rate structure [4 marks]

- Customer cost Ksh. 200 per month
- Energy cost Ksh. 18 per kWh
- Demand cost Ksh. 50 per kW per month
- Fuel adjustment Ksh. 0.075 per kWh
- Taxes Total of 14% on the entire bill

(c) The primary function of a steam generator is to generate steam under pressure. Explain four other functions of modern steam generators [4 marks]

(d) Differentiate between utility cost analysis audit and Standard energy audit [4 marks]

(e) Explain eight (8) typical activities that an energy manager carries out in an organization /facility [8 marks]

(f) Explain four protocols that can be used to evaluate condenser and boiler performance [4 marks]

Question 2 /20 marks/

Execution of an energy audit is often not a linear process and is rather iterative. Analyze step 1-4 procedure for a detailed energy audit starting with an explanation of each step [20 marks]

Question 3 **/20 marks/**

- a) Analyze the eight major components of an energy management program in an industrial set up [8 marks]
- b) Explain how the following measures can be used to solve the problem of boiler inefficiencies.
- i. Improved process control [3 marks]
 - ii. Reduce flue gas quantities [3 marks]
 - iii. Reduce excess air [3 marks]
 - iv. Improve Insulation [3 marks]

Question 4 **[20 marks]**

- a) During energy management (utilization) program one of the major steps involved in the determination of energy uses and losses. Analyze in detail what constitutes this step [16 marks]
- b) Explain four energy conservation measures suitable for compressed air systems in a manufacturing plant [4 marks]

