KIBABII UNIVERSITY

2022/2023 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER

MAIN EXAMINATIONS MARKING SCHEME

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

COURSE CODE: REN314

COURSE TITLE: ENERGY MANAGEMENT

DATE: 16/12/2022 **TIME: 9:00-11:00AM**

INSTRUCTIONS TO CANDIDATES

Answer question ONE and any other two questions

This paper consists of 5 printed pages. Please Turn over

QUESTION ONE

a. Define the following terms:
   I. Energy management (2mks)
   II. Energy efficiency. (2mks)
   III. Energy conservation (2mks)
   IV. Kilowatt hours used (2mks)
   V. Demand profile (2mks)

b. State FOUR benefits of energy management in an organization (4mks)

c. Explain what is meant by Optimization of energy supply? State any FOUR ways in which it can be achieved in energy management. (5mks)

d. Explain the following terms as used in energy management steps?
   I. Internal comparison (2mks)
   II. External comparison (2mks)

e. Data in energy management can be obtained from both primary and secondary sources. Give any THREE ways in which primary data can be obtained (3mks)

f. Differentiate between qualitative and quantitative research (2mks)

g. Briefly describe the procedure of carrying out survey as an energy data collection method.

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 (3mks)
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. State the main objective of demand profile in energy management procedures (2mks)
c. Explain how the concept of consumer awareness can help in energy management in any organization (5mks.)

QUESTION THREE

a. As an energy management expert, you have been contracted by Kibabii University to give suggestions on how equipment efficiencies can be maximized. State any FIVE ways in which equipment energy efficiency can be maximized. (5mks)
b. Briefly explain how consumer awareness affect the energy use (3mks)
c. The table shows the total energy consumption by Kibabii High School in the year 2018. Find the total energy consumed that year in kWh and the total amount spent in purchasing these energy types (12mks)

Energy type	Purchased Units	Purchased Units in kWh	Cost per kWh	Total Cost
Electricity	61500kWh	61500kWh	5.00	
Propane	2000m^3		1.5	
Oil	20000 l		9.00	
Totals				

Use the information below:

FROM	CONVERSION FACTOR	TO
MJ	0.2778	kWh
GJ	277.8	kWh

The calorific value for propane and oil are 92.6GJ/M^3 and 38MJ/L respectively.

QUESTION FOUR

a. Explain how weather patterns affect energy demand in a residential setting (3mks).

b. State ANY FOUR objectives of carrying out energy analysis (4mks).

c. During energy monitoring, Bungoma referral hospital produced data as shown in the table below:

Degree days experienced per month (x)	72	88	95	106	169	204	244	265	290	298	332	345
Gas Consumption per month (y) (GJ)	482	520	634	570	671	860	903	940	1007	1210	1020	1131

I. Find the base fit curve equation for the data given in the table above (10mks).

II. Use the data in the table above to draw a regression analysis curve. (3mks)