



# KIBABII UNIVERSITY

2021/2022 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

MAIN EXAMINATIONS

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

**COURSE CODE: REN111**

**COURSE TITLE: Survey of Energy Sources**

**DATE: 27/01/2022**

**TIME: 8-10AM**

## INSTRUCTIONS TO CANDIDATES

Answer question ONE and any other two questions

This paper consists of 2 printed pages. Please Turn over

### Question One

- (a) The table below shows electricity use in four countries in 2012 and the projected scenario in 2040. Study the table carefully and answer the questions.

	Country	2012 Electricity Use (GWh)	2012 Population	2012 Per Capita (GWh/yr)	2040 Projected Per Capita (GWh/yr)	2040 Projected Population	Calculated Electricity Use (GWh)
1	Kenya	6,329	41,944,000	0.15	2.0	64,059,000	128,118
2	Morocco	25,274	31,968,000	0.8	2.5	40,267,000	100,667.5
3	South Africa	218,202	49,004,000	4.5	5.0	49,071,000	245,355
4	U S A	3,882,599	311,592,000	12.5	8.0	380,016,000	3,040,128

- (i) State what Per Capita (MWh/yr.) represent [1 Marks]
- (ii) Show how the 2012 Per Capita (MWh/yr.) of 0.15 has been obtained for Kenya [1 Marks]
- (iii) Explain briefly how electricity is used in an average Kenyan urban home [4 Marks]
- (iv) In your opinion, why does USA have a very high Per Capita (MWh/yr) ? [2 Marks]
- (v) Explain why Per Capita (MWh/yr) for USA is projected to have fallen to 8.0 in 2040 from 12.5 in 2012 [2 Marks]
- (vi) Explain why Per Capita (MWh/yr) for Kenya is projected to have increased to 2.0 in 2040 from 0.15 in 2012 [2 Marks]
- (b) State the law of conservation of energy [2 Marks]
- (c) Briefly explain how the following forms of energy are derived from the sun [4 Marks]
- (i) Biomass [4 Marks]
- (ii) Fossil fuel [4 Marks]
- (iii) Wind energy [4 Marks]
- (iv) Wave energy [4 Marks]

### Question Two

- (a) Define "Power Plant" [2 Marks]
- (b) Briefly explain why electricity is the preferred form of energy [2 Marks]

(c) With the aid of sketches, describe how electricity is generated in the following power plants

- (i) Coal Power Plant [4 Marks]
- (ii) Nuclear Power Plant [4 Marks]
- (iii) Diesel Power Plant [4 Marks]
- (iv) Wind Turbine Power Plant [4 Marks]

### Question Three

- (a) Define Renewable Energy [2 Marks]
- (b) State any **Seven** renewable energy sources [7 Marks]
- (c) State the process that is responsible for energy from the sun [1 Marks]
- (d) With the help of a sketch, describe the carbon cycle [10 Marks]

### Question Four

Explain how the availability of energy affects the provision of the following services in rural areas

- (i) Education [4 Marks]
- (ii) Health [4 Marks]
- (iii) Water [4 Marks]
- (iv) Transport [4 Marks]
- (v) Agriculture [4 Marks]

### Question Five

Explain how the usage of energy resources in industry leads to environmental damages by polluting the atmosphere. [20 Marks]