



KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

**FOURTH YEAR FIRST SEMESTER
SUPPLEMENTARY EXAMINATIONS**

FOR THE DEGREE OF RENEWABLE ENERGY

COURSE CODE: REN 415

COURSE TITLE: ENERGY STORAGE TECHNOLOGY

DATE: 17/11/2022

TIME: 8:00AM-10:00AM

INSTRUCTIONS TO CANDIDATES

TIME: 2 Hours

Answer question ONE and any TWO of the remaining

KIBU observes ZERO tolerance to examination cheating

Section A-Compulsory (30 marks)

Question one

- a) Define the term energy storage? (2mks)
- b) List any five parameters that are used in determining and selection of energy storage devices. (5mks)
- c) Give FOUR reasons why energy storage is important. (4mks)
- d) State the main differences between renewable and conventional sources of energy In terms of:
 - I. Stability (2mks)
 - II. Pollution (2mks)
- e) Energy storage concept is more suitable for renewable energy resources than conventional energy resources. Discuss (5mks)
- f) List the factors that influence the energy storage capacity of a fly wheel (3mks)
- g) What are the advantages of using conventional sources of energy? (3mks).
- h) List the FOUR main energy storage technologies (4mks)

Section B -Answer any Two Questions (40marks)

Question TWO

- a) Using well labelled diagram, describe the working operation of:
 - I. Pumped hydro energy storage methods.(10mks)
 - II. Fly wheel(10mks)

Question Three

- a. A householder sticks a shiny silver coated sheet of plastic bubble wrap on the wall behind the radiator in the lounge in order to save energy. Explain how this can reduce heat loss from the lounge by conduction, convection and radiation. [6 marks].
- b. Differentiate between Energy transmission and energy distribution as used in electricity (4mks.)
- c. Give two factors that determine the choice of energy transportation mode (2mks).
- d. Fill the table below matching the energy source with the relevant transportation mode (4mks)

Energy Source	Transportation mode
1. Natural gases.	
2. Electricity	
3. Oil	
4. Coal	

- e. Support or oppose the following statement "Energy conservation is our best and cheapest source of energy we have." (3 mks).

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Question Four

- a. With the aid of a well labelled diagram, describe the working principle of a fuel cell as an energy storage device (10mks)
- b. Describe the industrial applications for the following energy storage techniques.
 - i. Flywheel (3mks)
 - ii. Pumped water storage system. (2mks).
 - iii. Fuel cell (5mks)

Question Five.

- a. Differentiate between latent and sensible heat as used in thermal energy storage techniques. Use diagrams. (6mks).
- b. Give the advantages and disadvantages of using nuclear energy.(4mks)
- c. Hydrogen technology can be the solution to the current energy crisis in transport sector. Give explanations in support or opposing this statement. (6mks).
- d. Define the following terms as used in current environmental issues. (4mks)
 - i. Greenhouse gases.
 - ii. Acid rain.
 - iii. Afforestation.
 - iv. Deforestation