

**UGANDA MARTYRS UNIVERSITY**  
**FACULTY OF BUSINESS ADMINISTRATION AND MANAGEMENT**  
**BACHELORS OF SCIENCE IN ECONOMICS AND NATURAL RESOURCE**  
**MANAGEMENT**  
**ECTF 105: ENERGY EFFICIENCY AND STORAGE APPLICATIONS**  
**BSC ENM 1**  
**FINAL ASSESSMENT EXAMINATION 2022**

**Date:** Thursday 14<sup>th</sup> July 2022

**Time:** 9:30am to 12:30pm

**INSTRUCTIONS:**

This question paper comprises of two sections A and B. Section A is compulsory and carries 40 marks

ii. Attempt any three questions from section B

iii. Answer Four questions in total

**SECTION A (Compulsory)**

Uganda has for the last few years faced energy deficiencies, which have slowed economic growth and development. Due to the current inflationary tendencies and unpredictable budget constraints, Ugandans are devising ways of cutting expenditures in numerous ways including saving energy to reduce utility bills. But did you know that efficient energy use does not only reduce your utility bill but is also one of the most effective ways of promoting a country's social and economic development?

Last year, Uganda held its annual energy efficiency week; Organised under the theme "Energy for social and economic development-use it efficiently", the general public was sensitized about the benefits of using renewable and energy efficiency technologies to promote efficient utilisation of energy in all sectors of the economy.

Energy State Minister Eng Simon D'Ujanga said at the launch of the energy efficiency week recently, that using energy efficiently is the only cheapest source of additional electricity. *"Generating additional electricity from thermal power plants is very expensive, thus energy efficiency makes sense today than it has ever done before,"* Eng D'Ujanga said.

He called upon Ugandans to make maximum use of the available electricity by adapting energy efficient technologies and energy systems to promote



efficient energy utilization. Several agencies and companies including the government under the Ministry of Energy and Mineral development, World Bank, Umeme and a number of private companies that provide energy saving products, are giving more attention to effective energy use.

Promoting efficient energy utilisation in the 21st century when resources are scarce, saving energy saves money, which can be used for other necessities and the saved energy is made available for other users reducing load shedding. "It is cheaper to save a unit of electricity than to generate it by other means," Eng D'Ujanga said;

"Sunshine is abundant in Uganda and can be converted into usable natural electricity," Dr Paul Sagala, Director of Engineering, Bernard & Sons International, a firm that generates and supplies renewable energy said. The less energy people use, the lower the demand on the diminishing energy resources and reduced emissions of greenhouse gases-which are believed to be among the main causes of climate change and global warming.

Eng D'Ujanga, however, said inadequate investment is still a big challenge to the energy sector. Investments in the abundant cleaner renewable energy resources like solar-which converts sun rays into electricity-to supplement the costly grid power supply is also still wanting

The Government has put various measures to save on power consumption.  
(Extracted from monitor Newspaper updated Jan 2021)

**Required:**

- a) Explain any five forms of indicators that can be used to monitor changes to improve energy efficiency. **(10 marks)**
- b) What technologies and systems can be explored to improve efficient energy utilization in the country? **(10 marks)**
- c) Show how energy use may be managed to improve country's social and economic performance. **(8 marks)**
- d) Give any five benefits that can be enjoyed as a result of energy efficiency in the buildings. **(8 marks)**
- e) As an expert in Energy efficiency management, advice government on how they can manage this threat. **(4 marks)**

**SECTION B (Attempt any three questions)**

**QUESTION TWO**

The quantity and quality of daylight in buildings continually varies due to the natural changes in sun and sky conditions from one moment to the next. Good illumination or lighting is necessary for all buildings to serve the intended purpose.

- a) In relation to the above, describe the purpose and benefits of artificial illumination. **(10 marks)**
- b) Give the various basics of heating and conditioning. **(10 marks)**

### **QUESTION THREE**

Passive cooling is a building design approach that focuses on heat gain control and heat dissipation in a building in order to improve the indoor thermal comfort with low or no energy consumption.

- a) Identify the common techniques which facilitate the above situation **(10 marks)**
- b) Describe the various energy storage application and their importance in the renewable energy. **(10 marks)**

### **QUESTION FOUR**

Due to increasing prices of electricity to both the household and industries, most people have resorted to illegal connections and illegal consumptions of energy power in order to survive and continue with their businesses.

- i) Differentiate Direct Heat Gain and Indirect Heat gain. **(3 marks)**
- ii) Show the importance of energy audit in curbing the above vice **(12 marks)**
- iii) Propose any five gadgets that can be used to enjoy energy usage **(5 marks)**

### **QUESTION FIVE**

- a) Distinguish between Radiative cooling and Evaporative cooling. **(2 marks)**
- b) Describe the passive cooling strategies that can be adopted to reduce heat gain to manageable levels. **(8 marks)**
- c) Briefly explain any four types of energy storage systems. **(10 marks)**

### **QUESTION SIX**

- a) Describe the three basic mechanism for energy insulation. **(3 marks)**
- b) Show the importance of energy insulation to the users. **(7 marks)**
- c) Identify the various street design elements and the reasons why they are used in microclimate. **(10 marks)**

**SUCCESS**