



SCHOOL OF COMPUTING AND ENGINEERING SCIENCES  
MASTER OF SUSTAINABLE ENERGY TRANSITION  
MSSET: 8301: FUNDAMENTALS OF POWER SYSTEM

END OF SEMESTER EXAM

**Date:** 16<sup>th</sup> January 2023

**Time:** 2 Hours

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**Instructions:**

1. This Examination consists of **FIVE** questions. Attempt four questions.
  2. Question One is compulsory
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**Question One (Compulsory)**

**[15 Marks]**

- a. Discuss, giving specific examples, the players in the power systems in Kenya, as provided in the Energy Act 2019 (4 marks)
- b. Explain the relationship between the power systems course you are taking and sustainable energy transitions (2 marks)
- c. Illustrate the concept of digitization, decentralization and de-carbonization using the Kenya Power Market as an example (4 marks)
- d. Differentiate between energy modelling, simulation and optimization (3 marks)
- e. Discuss the concept of power system reliability (2 marks)

**Question Two**

**[15 marks]**

1. Discuss ways through which digitization can help improve power system reliability in and Sustainability Kenya (5 marks)
2. The commercial and industrial power supply model has taken root in Kenya. Using specific examples, discuss:
  - a. The push and pull factors that have contributed to the growth of the model (8 marks)
  - b. The challenges faced by this model (7 marks)

**Question Three**

**[15 marks]**

- a. What is the definition of time resolution? (2 marks)

- b. In Energy System Optimization Modelling, what is the difference between a parameter and a variable? (2 marks)
- c. In Energy System Optimization Modelling, what is the objective function? (2 marks)
- d. What are the advantages of open energy modelling? (2 marks)
- e. Discuss, using examples, how modelling and optimization can be used to improve energy system decentralization in Kenya using the mini grid model. In the discussion, be sure to discuss the variables that might be considered, the objective functions and the parameters (7 marks)

**Question Four**

- a) Describe how devolution and INEP has impacted the LCPDP in Kenya since 2010 and explain how you see its development. [5 marks]
- b) Kenya devolution in the energy sector requires that each of the 47 counties in Kenya prepare its one County Energy Plan. Give a general overview on how far the counties have progressed in this matter. [5 marks]
- c) What exactly is a GIS based tool such as the one used in Narok called Energy Access Explorer [5 marks]

**Question Five**

**[15 marks]**

- a) Discuss three broad goals of energy market policies and regulations and three tools that can be used to meet these goals. [8 marks]
- b) Give a title to the graphic below and make three affirmations based on it: [7 marks]

