Learning Guide Unit 1

Reading Assignment

As you read through the resources and watch the videos, consider the following:

- What differentiates basic logic gates in terms of their operations and functionalities?
- How do Boolean algebra and logic gates complement each other in the construction of digital circuits?
- Explain the practical application of Boolean algebra and logic gates by creating digital circuits.

Textbook:

1. Ndjountche, T. (2016). *Digital electronics 1: Combinational logic circuits*. John Wiley & Sons, Incorporated.

- Log into the UoPeople library and go to LIRN. Click on Access to Library and Information Resource Network, go to Computer Science and click on EBook Central. Search for the entire name of the ebook. Use the Learning Resource Center to read on how to use the online library.
- Read Chapter 2: Logic Gates (pp. 67 - 111)
  - Section 2.1: Introduction
  - Section 2.2: Logic gates
  - Section 2.3: Three-state buffer
  - Section 2.4: Logic function
  - Section 2.5: The correspondence between a truth table and a logic function
  - Section 2.6: Boolean algebra
  - Section 2.7: Multi-level logic circuit implementation
  - Section 2.8: Practical considerations
  - Section 2.9: Demonstration of some Boolean algebra identities

- Sections 2.1 & 2.2: These sections will introduce logic gates and the foundational elements of digital circuits. You will gain an understanding of their significance in modern electronics and in processing binary information. You will delve into the world of logic gates, exploring their various types and functions and grasp how these gates perform logical operations. You will also learn about their implementation using electronic components.
- Sections 2.3 & 2.4: These readings will help you to uncover the concept of Three-state buffers, a unique kind of gate that introduces a third state beyond the conventional binary values. You will be able to understand their practical application in managing data flow within digital systems. These readings will also help you to discover the essence of logic functions, which define the relationship between input and output signals in a digital circuit.
- Sections 2.5 & 2.6: These readings will expose the connection between truth tables and logic functions.
  You will learn how truth tables succinctly represent the behavior of logic gates and how they aid in logical analysis and circuit design. These reading will help you to venture into the world of Boolean Algebra, a powerful tool for simplifying and manipulating logical expressions and enable you to understand how Boolean algebraic laws facilitate efficient circuit design and analysis.
- Sections 2.7 & 2.8: Through these readings, you will explore the concept of multi-level logic circuit implementation, where combinations of logic gates collaborate to perform more intricate tasks. The readings will help you in grasping how these multi-level designs contribute to sophisticated circuitry and will also delve into practical considerations while designing digital circuits.
- Sections 2.9: You will witness the application of Boolean Algebra identities in circuit design and see how these identities simplify complex expressions and aid in optimizing logical operations.

Videos:

1. Everyday e-learning. (2021, July 6). *How to install & setup logisim* [Video]. YouTube.

    - The video provides step-by-step instructions on installing and setting up Logisim software version 2.7.1 along with the Java Runtime Environment. It aims to make the process straightforward and easy to follow for users.

2. Neso academy. (2016, March 8). *Logic gates (Part 1)* [Video]. YouTube.

    - This video provides a concise overview of various types of gates used in digital electronics, including basic gates and discusses various significant problems associated with NOT gate using simple elaboration.
      It offers a brief introduction to these essential components used in designing digital circuits.