THE NATIONAL UNIVERSITY OF LESOTHO

Department of Mathematics and Computer Science

CS3520 - Computer Organisation and Architecture I

Assignment 0 - Digital Alarm Clock

Due Date: 22 September 2023 **Marks:** 50

Objective:

Design and simulate a digital circuit that implements the functionality of a simple digital alarm clock using basic digital logic gates. This assignment aims to assess your understanding of digital logic design principles and your ability to create a functional digital circuit.

Task Description:

Task Description: You are tasked with designing a digital alarm clock that has the following functionality:

- It should display the current time in hours and minutes using a 24-hour format (e.g., 13:45).
- The clock should have buttons for setting the hours and minutes.
- The clock should have buttons for setting the alarm time.
- It should have a button to toggle the alarm on/off.
- When the alarm time matches the current time, an LED should light up to indicate that the alarm is going off.

Requirements:

1. **Design:** In your group, design a digital circuit that can implement the functionality described above. Use basic digital logic gates such as AND, OR, NOT, flip-flops, and counters. Document your circuit design with a clear schematic diagram.
2. **Simulation:** Choose a free digital logic simulation software tool (e.g., Logisim, Digital, or any other of your choice) and simulate your digital circuit. Ensure that your circuit behaves as expected and accurately emulates the alarm clock's functionality.
3. **Testing:** Write a brief report outlining your testing process. Describe how you verified that your digital alarm clock functions correctly, including specific test cases and expected outcomes.
4. **Group Work:** Collaborate effectively within your group to distribute tasks and ensure a coherent final design. Each group member should contribute to the design, simulation, and testing phases.

Submission:

Submit the following as your assignment:

1. A document containing your circuit schematic diagram.
2. Screenshots or a video demonstrating the simulation of your digital circuit.
3. A brief one-page testing report outlining your test cases and results.