

General Information:

1. Students should work in teams of three (no more or less).
2. Two projects are presented in this document where each team selects only one project.
3. It is not allowed for one project to be selected by more than fourteen groups.
4. Due date is: Saturday, May 28, 2022.

Project (A)

Project Description:

The objective is to design and implement a digital circuit that acts like a digital lock for a safe which accepts a binary passcode, compare it to a preset code by a comparator and takes an action depending on the validity of the entered value. If a wrong code is entered for three successive trials, the lock should no longer accept a new value unless a Reset switch is pressed.

Project Requirements:

1. A 3-bit binary passcode is entered through switches (Preferably dipswitches for ease of use). The preset code is also adjusted through dipswitches.
2. A switch is used to pass the input to the comparator via flip flops.
3. Wrong trials counter is incremented each time a code is passed and a false indication is given by the comparator. Ready-made counter IC could be used.
4. Output action is to illuminate a green LED in case of correct code or a red LED otherwise and another output LED is to be illuminated when wrong trials counter reaches three.

Project Deliverables:

Students should submit the circuit implemented on a breadboard as well as project documentation which includes the design, simulation, and pictures of the implemented circuit.

Project (B)

Project Description:

The objective is to design and implement a digital circuit that acts like a digital clock that counts seconds only. Each time seconds reach 59, the next clock cycle should clear counter. Also, the circuit should have the option to count to a preset number to act as a timer/stopwatch. When the preset number is reached, a led is to be illuminated.

Project Requirements:

1. Two decimal digits represent the seconds
2. Each digit is represented by a seven-segment module.
3. Ready-made programmable counter IC could be used.
4. Ready-made BCD to 7-segment decoder IC could be used.

Project Deliverables:

Students should submit the circuit implemented on a breadboard as well as project documentation which includes the design, simulation, and pictures of the implemented circuit.