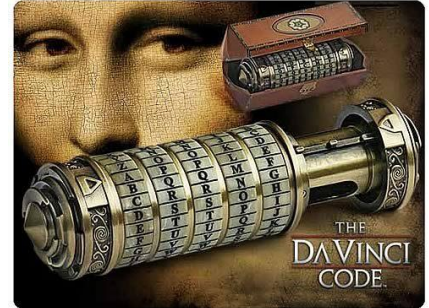


TITLE 1: DA VINCI Digital Cryptex

Preamble

You will be required to design and simulate an enhanced *electronic* version of a cryptex. A cryptex is a primitive, mechanical, vault used to hide a secret message which can only be opened by aligning a unique combination of keys. The secret message is usually written on a scroll of thin papyrus wrapped around a fragile vial of vinegar as a security measure: if one does not know the password but tries to open the cryptex by force, the vial will break and the vinegar will dissolve the papyrus before it can be read.



Specifications

You will have to design an electronic circuit that will use:

1. a **numeric keypad (0-9)** as input as far as possible.
2. A unique correct **PIN: 7635** has to be entered **sequentially** to actuate a relay to open the cryptex.
3. There is no need to implement a relay and actuator part: two LEDs (one GREEN and one RED will suffice; the GREEN LED is ON **if and only if** the correct PIN is entered, otherwise, the RED LED should always be ON).
4. No need to use a transformer as the system will not be MAINS powered. Assume that the system will be operated by a 5V DC supply.
5. You **MUST use ONLY** the following components for your design: Power Source, Resistors, LED, Capacitors, Transistors, Displays, Basic logic gates ICs, Decoders, Timers, and Flip-Flops.
6. You **CANNOT** use Programmable ICs, Micro-controllers or Multi-Function ICs to design the system.

Tasks

1. Give a brief description of your system. Mention any limitations, if any. [10 marks]
2. Give a complete circuit schematic with appropriate values for all components used. [50 marks]
3. Optimize and provide a 3D IC based-solution capture using Ultiboard feature. [15 marks]
4. Finally, simulate your design to test the proper functioning of your system. [25 marks]

Deliverables

Email your report with screen captures, as well as the final circuit (.ms14) files zipped with your index number as filename and title number (e.g., 2213_123456_title1.zip) at bee23aft@rishiheerasing.net respectively by 11:59 pm on **Sunday 15th September 2024**.