

TITLE 2: VESPER TEMPORIS

Preamble

You are required to design a '24 Hour Night Timer' for Nosferatu when he goes cycling every Saturday night. The timer should have four 7-segment LEDs i.e. should count up to 23 Hours and 59 minutes and 59 seconds in increment of 1 second. Nosferatu can pause the timer if he spots a beautiful lady while joyriding. He can also reset the timer any time he wishes to.



Specifications

You will have to design an electronic system with:

1. Six 7-segment **RED** (*his favourite colour :P*) LEDs.
2. One **PAUSE** button (bonus) and one **RESET** button to pause and reset the timer as needed.
3. Nosferatu starts cycling once it gets appreciably dark. You need to use and configure a Light Dependent Resistor for that purpose. (Note: Multisim does not make provision for LDRs so to simulate your design you have to use an Opto-coupler and potentiometer combination to represent the LDR (bonus)).
4. You need to use a step-down transformer as the system operates on 230V AC supply (*Nosferatu can generate AC power from one of his special organs*) as the timer should operate on 5V DC.
5. You **MUST ONLY** use the following components in your design: Power Source, Transformer, Opto-coupler, Potentiometer, switches, LED Display, Resistors, Capacitors, Transistors, LED, Basic logic gates ICs, Decoders, Timers, and Flip-Flops.
6. You **CANNOT** use Programmable ICs, Micro-controllers, 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_title2.zip) at bee23aft@rishiheerasing.net respectively by 11:59 pm on **Sunday 15th September 2024**.