ELG3336: Test 2

This is not an assignment but a test to write.

You may prepare the design of the three problems in advance but do not use the answers in the test.

You must write the answers in a special answer sheet given to you during the test! No other sheet(s) are allowed!

Provide all needed sketches and graphs!

Design Problem 1

A remote door lock is operated by an electrical relay that requires 20 mA. The relay can be opened by either switch A or B or both. The information from the switches is combined in a logic circuit. The logic levels are 0 to 0.5V for ZERO (0) and 4.5-5V for ONE (1). Draw a suitable circuit that includes a resistor, transistor, relay, and diode. Place the relay in the Collector circuit, the resistor in the Base circuit and the diode in parallel with the relay to provide a path for current due to energizing the relay.

- Design the required logic circuit using either NAND circuit or NOR circuit.
- Determine the value of *R* in the base circuit assuming $\beta = 100$ and $V_{be} = 0.7V$.

Design Problem 2

Design a logic circuit for the operation of CBY elevator. Write the problem statement, truth table, logic equation, optimize the logic equation by using K-map, and draw the logic circuit.

Design Problem 3

Draw the block diagram for a cardiac demand pacemaker. Design the conditioning circuit and the counter basing on 0.6s natural beat duration and 0.9s for the artificial beat.