Lab 2: Combinational Design

PURPOSE

The purpose of this introductory laboratory project is to provide a hands-on opportunity for basic combinational design and simulation.

PAIR AND TRIO DETECTOR

Consider a simple electronic device with four generic sensors A, B, C, and D. The device will have two outputs: P (for PAIR) and T (for TRIO). This device should function as follows:

- The output P should be asserted true (1) if and only if EXACTLY two of the inputs are asserted true (1).
- The output T should be asserted true (1) if and only if EXACTLY three of the inputs are asserted true (1).

For example, the input assignment 0111 (A'BCD) has exactly three inputs asserted true. Thus output P should be false (0) and output T should be true (1) for this input assignment.

LAB 2 - DESIGN

1) [2 points] Create a truth table that realizes the functional goals as expressed above.
2) [2 points] Create a Boolean expression each output (P and T).

LAB 2 - SIMULATED IMPLEMENTION

1) [2 points] Simulate an implementation of the combinational digital device that you have designed. Copy into your lab notebook a printout of the implementation. Make certain that ALL device outputs (from every gate) are labeled with its appropriate Boolean expression. This includes the primary outputs P and T, but should also include every intermediate value/wire/net in your implementation.

LAB 2 - DEMONSTRATION

[2 points] Demonstrate/test the function of your simulated circuit in your e-labbook. Be prepared to answer questions about the function of the devices and the choices you faced in the implementation. You may be asked to demonstrate the functionality of your design for some input values.

[2 points] **Integrated Writing:** Refer to "Digital System Design: Engineering Journals & Lab Policies" for details. 0.5 points each for Completeness, Clarity, Organization, and Testing.