EE214 Digital Circuits Laboratory
Wadhwani Electronics Laboratory
Electrical Engineering IIT Bombay

Problem set: 4 Date: September 6, 2024

BCD Adder

Instructions:

1. Use structural modelling for this experiment.
2. Do a rough pen-paper design of the circuit and get it verified by your TA.
3. Use structural modelling to design the Adder.
4. Perform RTL simulation using the provided testbench and tracefile.
5. Perform scanchain based testing using Xenon board.
6. Submit the entire project file in .zip format on Moodle.

Problem Statement:

1. Design a circuit to add two 4-bit BCD numbers. Input numbers are only in BCD (0 to 9) format. Follow the given steps to design the BCD adder -
   - Design a 4-bit binary adder for initial addition.
   - Design a logic circuit to detect if the initial sum greater is than 9.
   - Design another 4-bit adder to add (0110) to the initial sum if it is greater than 9 or the carry is 1.
2. Write a VHDL description using structural modelling for the same.
3. Simulate the design using the generic testbench and the given tracefile to verify its correctness.
4. Perform scanchain based testing using Xenon board.
5. Tracefile format: $(< A3A2A1A0B3B2B1B0 >< Y4Y3Y2Y1Y0 >< 11111 >)$ TRACEFILE