

Digital Systems and Microprocessors (ELE2002M)

Lab Assignment-4

(Maximum Marks 20)

All the questions need to be simulated and tested. So please write a testbench for each to verify the simulation results of your design.

Read about structural modeling and perform the following tasks:

1. Using **gate level** primitives, build a three-to-eight line decoder module with an enable pin. (4 marks)
2. Using **structural modeling**, using the the 3-to-8 line decoder module above to build a 4-to-16 line decoder module. (2 marks)
3. Use **structural modeling** to construct a full adder module using 3-to-8 line decoder module above and OR gates. (2 marks)

Study **dataflow** modeling and **behavioral** modeling (from the book, chapter 4). Read about when to use “**always**” and when to use “**assign**” and then perform the following tasks:

4. Construct a 2-to-1 line multiplexer module using **dataflow modeling**. (2 marks)
5. Then use three 2-to-1 line multiplexer modules to construct a 4-to-1 line multiplexer module using **structural modeling**. (4 marks)
6. Construct a 2-to-1 line multiplexer using **behavioral modeling**. (2 marks)
7. Construct a 4-to-1 line multiplexer using **behavioral modeling**. (2 marks)
8. Read the Zybo board manual and understand the input output ports available for this board. Write the constraints file for all the above modules and generate the .BIT file (2 marks)