Lab 2
Digital Logic Gates

Objectives

- To get familiar with the Xilinx Schematic Editor Tool.
- To design and implement simple combinational logic circuits using the Schematic Editor and Simulator.
- To download your circuit onto the prototype prototype board and test it.

Laboratory Instructions

- Create a directory with your name on the C drive of your lab PC. Use this directory to create your project, store your results, bitstreams, etc. during the lab session.
- You can bring complete project files on a floppy disk and then use the **Copy Project** command from the Project Manager menu to copy it into the directory you created above.
- Alternatively, you can create a new project in your directory on the C drive and then copy your files to that new project directory. Remember to **Add** your .SCH file to the project.
- Perform functional simulation of your design and have it checked by your TA.
- Refer to appendix A for instructions on performing functional simulation.
- Refer to appendix B for instructions on how to download the schematic to the board.
- Test and demonstrate your circuit to your TA.
- Before you leave the lab please **remove** the files and directories that you created on your lab PC and leave our workplace clean and tidy.

Design Problems

Using the Xilinx Schematic Editor Tool, design, test and demonstrate circuits based on the specifications given in the following table.

x_i	y_i	c_i	c_{i+1}	s_i
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

1. Using AND, OR, and XOR gates design the full adder that is specified by the above table.

2. Using NAND and OR gates design the full adder that is specified by the above table.

3. Using multiple-input NAND gates design the full adder that is specified by the above table.

x_i	y_i	b_i	b_{i+1}	d_I
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

4. Using the basic logic library implement the full subtractor that is specified by the above table.

5. Download your circuit onto the prototype board and test it. You need to use one of the Adder and Subtractor circuits that you had designed. The output will be seen in the seven segments display and your input will be given via the keyboard to the input pins specified. Refer to appendix B for instructions on how to download the schematic to the board.