

# ECE 2140

## Experiment 11

### 4-input Multiplexer

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#### Equipment and Parts Required

- 1 GAL (16V8 or equivalent)
- 1 DC Power Supply
- 1 Digital Voltmeter

#### 1. Write a Verilog program for a 4-input multiplexer

Print the source code from the ispLEVER editor window, and attach it to the report.

```
module multiplexer4( x1, x2, x3, x4, Select, y);
input x1, x2, x3, x4;
input [1:0] Select;
output reg y;

always @ (*)
begin
    case (Select)
        2'b00: y <= x1;
        2'b01: y <= x2;
        2'b10: y <= x3;
        2'b11: y <= x4;
    endcase
end
endmodule
```

#### 2. Compile the Verilog code using ispLEVER

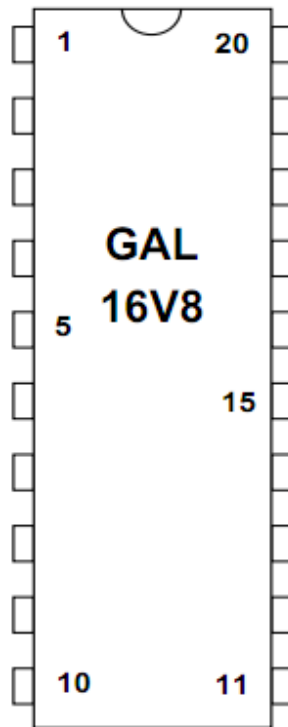
Follow the instructions posted on the course website to compile Verilog.

([http://www.seas.gwu.edu/~ece140/2011-spring/files/GAL\\_ ispLEVER.pdf](http://www.seas.gwu.edu/~ece140/2011-spring/files/GAL_ ispLEVER.pdf) )

Describe the detailed steps to compile your source code in ispLEVER.

### 3. Label the pins used for your 16V8 GAL after you compile & synthesize

Make sure to include this in your lab report.



### 4. Program the GAL chip using the JEDEC file created in step 2

Refer to the instructions on the course website

(<http://www.seas.gwu.edu/~ecelabs/appnotes/PDF/dataio.pdf>)

Describe the procedure to program the GAL chip in your lab report.

### 5. Experiment with your programmed GAL chip, and fill out the following truth table

$X1 = X3 = 0$  Volts,  $X2 = X4 = 5$  Volts

Select[1] (Volts)	Select[0] (Volts)	Y
0	0	
0	5	
5	0	
5	5	