

## EXPERIMENT 5. Sum-of-Products Realization

### ***Equipment and parts required:***

1 Hex Inverter (7404)  
1 Triple 3-input AND (7411)  
1 Quad 2-input OR (7432)  
1 Power Supply  
1 Digital Voltmeter  
1 Function Generator  
1 Digital Oscilloscope

### ***1. Find data sheet and specifications***

Find I/O pin numbers and specifications of all ICs from data sheet downloaded from the web (ECE labs)

Pin numbers: Vcc, ground, input and outputs of all gates.  
Absolute maximum voltages: Vcc and voltages at input pins.  
Normal operating voltages:  $V_{IL}$ ,  $V_{IH}$ ,  $V_{OL}$ ,  $V_{OH}$

### ***2. Find the sum-of-product canonical expression***

Write the sum-of-product canonical expression for the system defined by the following truth table

X	Y	f
0	0	0
0	1	1
1	0	1
1	1	0

### ***3. Wire a circuit***

Wire a circuit for the boolean expression derived in Step 2 on a breadboard.

### ***4. Connect power supply***

Adjust the power supply at 5 Volts and set the current limit to maximum. Then connect the power supply to Vcc and Gnd bus. Do not connect the power to the integrated circuit at this time.

### **5. Measure input and output characteristics**

Connect the output of the circuit to a digital voltmeter, and measure the output voltage for different input voltages. Before the measurement, connect Gnd and Vcc pins to the power buses of the breadboard.

<b>Input 1</b>	<b>Input 2</b>	<b>Output</b>
0 Volts	0 Volts	
0 Volts	5 Volts	
5 Volts	0 Volts	
5 Volts	5 Volts	

### **6. Minimize the circuit**

Minimize the sum-of-product expression obtained in Step 2, and implement the minimized circuit. Confirm if the minimum circuit is equivalent to the circuit implemented in step 2.