

EXPERIMENT 6. Product-of- Sums 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 product-of-sum canonical expression

Write the *product-of-sum* 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.

Input 1	Input 2	Output
0 Volts	0 Volts	
0 Volts	5 Volts	
5 Volts	0 Volts	
5 Volts	5 Volts	

6. Minimize the circuit

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