

Prelab

1. Design a 4-bit adder/subtractor using only full adders and EXCLUSIVE- OR gates. Do not use any multiplexers.
2. Design a combinational circuit using a minimum number of Full adders, and logic gates which will perform A plus B or minus B (A and B are signed numbers), depending on a mode select input, M. If M=0, addition is carried out; if M=1, subtraction is carried out. Assume $A=A_4 A_3 A_2 A_1 A_0$ and $B= B_4 B_3 B_2 B_1 B_0$ (Two 5- bit number). The circuit should be able to carry out the subtraction even if $A < B$. use an LED to indicate the sign of the result (LED ON for negative result and LED OFF for a positive result). The result of the operation should always appear in BCD form on seven-segment displays. The overflow bit (V) should be indicated by another LED (LED ON for $V=1$ and LED OFF for $V=0$). Do not use any exclusive-OR gates with the full adders; Use multiplexers. However, you may use one exclusive-OR gate for the above.

LAB

Parts List: DIP Switches, Three 74LS283 (Full Adder), Three 74LS86, One 74LS47, One seven-segment display, Two LEDs, 1K & 330 Ohms.

Implement the above circuit using a minimum number of SSI and MSI chips. Demonstrate the operation using switches and LED, seven-segment display (select from Data book)_etc. as needed.

Postlab

Design a combinational circuit that will perform the following operation:

S_1	S_0	Y
0	0	0
0	1	A
1	0	B
1	1	15_{10}

Assume that A is a 4 bit- number and $B = \overline{y_3} \overline{y_2} \overline{y_1} \overline{y_0}$. Draw a logic digram.