

COE 202, Term 122

Digital Logic Design

Assignment# 3

Due date: Sat. April 27

Q.1. It is required to design a 4-bit arithmetic and logic unit that has two 4-bit unsigned inputs $A=A_3A_2A_1A_0$ and $B=B_3B_2B_1B_0$ and one **5-bit output** $C= C_4C_3C_2C_1C_0$. The circuit implements the following functions based on the values of the three selection inputs: S2, S1 and S0.

S2 S1 S0	Function
0 0 0	$C = A + B$
0 0 1	$C = A - B$
0 1 0	$C = A+1$
0 1 1	$C = A-1$
1 0 0	$C = 2*A$
1 0 1	$C = A / 2$
1 1 0	$C = 1$ if $A>B$
1 1 1	$C = 1$ if $A<B$

- (i) Show the block diagram design of your circuit using MSI components like Adder, Multiplexor, as needed.
- (ii) Model your design in logic works.
- (iii) Test your design and verify its correctness by simulation. Show snapshots of your simulation to demonstrate its correctness. For each function, test at least 2 input combinations of your choice to demonstrate correct functionality.

Include snapshots of simulation output to illustrate the correctness of your circuit. Submit your solution as a word document along with the circuits in one zipped file.