LAB2:

(1) Implementation of Simple Logic Functions

1. Implement a 3-input NAND function using 2-input NAND gates only, and draw a schematic diagram.
2. Determine how to implement a 2-input OR function using 2-input NAND gates only, and draw a schematic diagram. Also implement 2-input OR function using 2-input AND gates and inverters.
3. Implement the function $Z = f(A, B) = A + BC$ using 2-input OR gate and 2-input AND gate.

(a) Implement the same function using only NAND gates.
(b) Make up a truth table for the function.
(c) Expand and simplify the Boolean equation to express Z as a sum of products in canonical form. Implement the sum of products notation using only NAND gates.

(2) Implementation of a Customized Logic Function

6. Show the un-simplified logic equation for your customized function, (see next page), expressed as a sum of minterms.
7. Obtain the truth table for the function.
8. Simplify the function using K-map.
9. Convert the simplified logic equation into a NAND gate implementation. (Use of stand-alone inverters is also allowed). Draw a schematic diagram for the implementation.

Customized Functions:

(One of the following customized functions will be assigned to you by your laboratory instructor)

1. $F1 = \sum (2, 7, 9,12,13,14,15)$
2. $F2 = \sum (2, 4, 5, 6,11,12,14)$
3. $F3 = \sum (2, 5, 7, 9,13,14,15)$
4. $F4 = \sum (0, 4, 5, 8,10,12,15)$
5. $F5 = \sum (0, 2, 7, 8, 9,12,13)$
6. $F6 = \sum (0, 5, 8,10,11,12,14)$
7. $F7 = \sum (3, 6, 8, 9,10,11,13)$
8. $F8 = \sum (1, 2, 3, 6, 7,10,13)$
9. $F9 = \sum (1, 6, 8, 9,10,12,14)$
10. $F10 = \sum (1, 2, 3, 6, 7,10,13)$
11. $F11 = \sum (0, 2, 4, 5, 6, 8,15)$
12. $F12 = \sum (2, 3, 5, 6, 7, 8,10)$
13. $F13 = \sum (0,1, 2, 4, 6, 9,10)$