LAB MANUAL #6

Objectives:

- To learn and understand the working of NAND gate and NOR gate

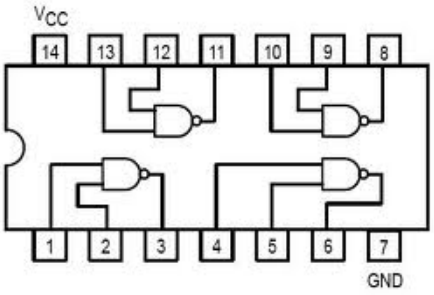
Introduction to NAND Gate

74LS00 IC contains four 2-input NAND gates. The function table and connection diagram for this IC are shown below:

Function Table

Inputs		Output
A	**B**	**Y**
L	L	H
L	H	H
H	L	H
H	H	L

Connection Diagram:



H= Logic High, L= Logic Low

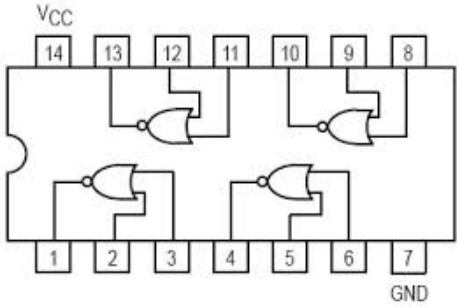
Introduction to NOR Gate

74LS02 IC contains four 2-input NOR gates. The function table and connection diagram for this IC are shown below:

Function Table:

Inputs		Output
A	**B**	**Y**
L	L	H
L	H	L
H	L	L
H	H	L

Connection Diagram:



H= Logic High, L= Logic Low

Question #1:

Simplify the Product-Of-Sums Boolean expression below.

$$Out= (A+B+C+\overline{D})(A+B+\overline{C}+D)(A+\overline{B}+C+\overline{D})(A+\overline{B}+\overline{C}+D)$$
$$(\overline{A}+\overline{B}+\overline{C}+D)(\overline{A}+B+C+\overline{D})(\overline{A}+B+\overline{C}+D)$$

NOR and NAND Implementation on logic trainer:

Question#2:

Implement on **Logic Works** the following using **only** the **NAND gates**

(a) Z = A.B **(b) X = A+B** **(c) XNOR**

Question#3:

Implement on **Logic Works** the following using only the **NOR gates.**

(a) Z = A.B **(b) X = A+B** **(c) XOR**

Question # 4: For the Boolean function $F1(A, B, C, D) = \sum m(2,4,12,14)$ do the following:

a) Find truth table

b) Find minimal SOP expression for Boolean function $F1$ using K-map. Draw K-map.

c) Draw the resultant expression obtained in part (b) and implement on **Logic Works** using **only NAND gates.**