

## **EEE-1212:Digital Logic Design Lab**

1<sup>st</sup> Year 2<sup>nd</sup> Semester

Session: 2015-2016

**Experiment Number: 08**

**Name of the Experiment:**

Design and construction of four input multiplexer

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**Experiment Date:** 30<sup>th</sup> October 2016

**Submission Date:** 6<sup>th</sup> November 2016

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## **Experiment name:**

Design and construction of four input multiplexer.

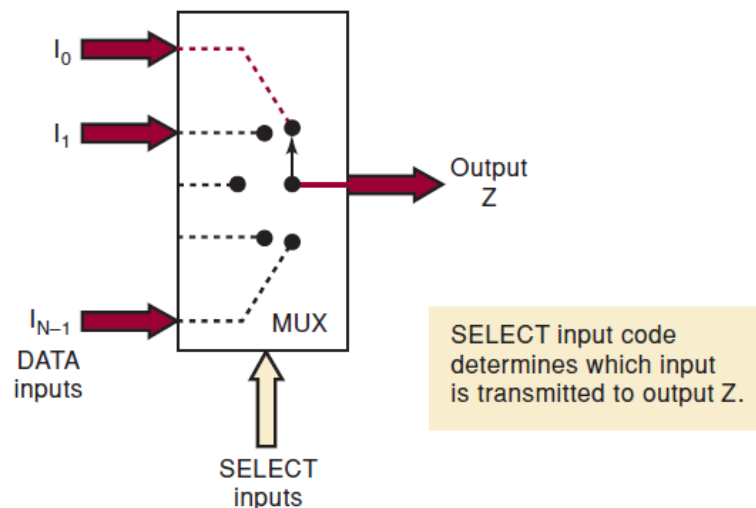
## **Objectives:**

The objective for this lab is to understand the multiplexer and design four input multiplexer.

## **Theory:**

A digital multiplexer or data selector is a logic circuit that accepts several digital data inputs and selects one of them at any given time to pass on to the output. The routing of the desired data input to the output is controlled by SELECT inputs (often referred to as ADDRESS inputs). In simple terms, it selects one of several input signals and passes it on to the output.

The multiplexer acts like a digitally controlled multi position switch where the digital code applied to the SELECT inputs controls which data inputs will be switched to the output. For example, output  $Z$  will equal data input  $I_0$  for some particular SELECT input code,  $Z$  will equal  $I_1$  for another particular SELECT input code, and so on. Stated another way, a multiplexer selects 1 out of  $N$  input data sources and transmits the selected data to a single output channel. This is called multiplexing.



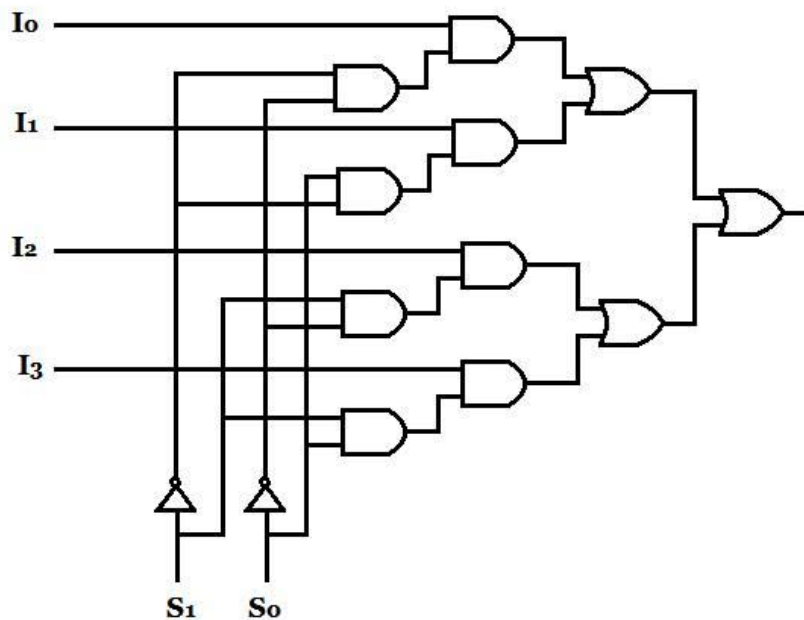
If we have  $n$  SELECT input then we use  $2^n$  inputs. e.g if we have 1 SELECT input then we can use 2 inputs , if we use 2 SELECT inputs then we can use 4 inputs and so on. the logic circuitry for a two-input multiplexer with data inputs  $I_0$  and  $I_1$  and SELECT input  $S$ . The logic level applied to the  $S$  input determines which AND gate is enabled so that its data input passes through the OR gate to output  $Z$ . Looking at it another way, the Boolean expression for the output is

$$Z = I_0\bar{S} + I_1S$$

If  $S=0$  then we get  $Z = I_0$

And if  $S=1$  then we get  $Z = I_1$

The same basic idea can be used to form the four-input multiplexer which are shown in the following figure :



### **Instruments:**

1. Trainer Board
2. 2 IC(s)-7408,IC-7432,IC-7400
3. Connecting wires

### **Procedure:**

- 1) At first we placed the integrated circuit with IC-7404, IC-7432 and 2 IC(s)-7408 on a breadboard properly. This IC is placed across the gap in the center of the breadboard.
- 2) Then we connected the inputs of the logic gate to the logic sources and its output to the logic indicator.
- 3) We connected the output of the AND gates to the OR gates and the output of the OR gate to the logic indicator.
- 4) We gave biasing to the ICs with the VCC (5 volt) and GND (0 volt).
- 5) The output of the circuit will be shown on the LED. (LED Off = 0, LED On = 1).
- 6) We observed outputs for various input combinations .

### **Result:**

In this experiment we need two SELECT inputs named  $S_1$  and  $S_0$  and four inputs named  $I_0$   $I_1$   $I_2$  and  $I_3$ . Each data input is gated with a different combination of select input levels.

SELECT Inputs		Outputs
$S_1$	$S_0$	
0	0	$Z = I_0$
0	1	$Z = I_1$
1	0	$Z = I_2$
1	1	$Z = I_3$

## **Discussion:**

In this experiment we worked with 4 IC's and verified the truth table of the given expression of 4 input multiplexer by using only Basic gates. but we faced some problem during the experiment.

- 1) At first we didn't understand what output we get from this experiment. So then we started reading multiplexer from the book and then understood it . So we need little bit more times to complete the experiment.
- 2) In this experiment we have to use 4 IC(s) at the same time. So we need so many wires to connect the IC(s) among themselves.
- 3) Besides, We also faced some technical difficulties when using trainer board. There are some input switches which are not working properly. So we changed this board and started our work with another trainer board.

But we figured them out and completed the experiment successfully.