CLASS: S.E. E &TC **SUBJECT: DC**

EXPT. NO. : 1 **Roll No.: 22119**

DATE:19th September, 2020

TITLE : STUDY OF MULTIPLEXER.

PRE-REQUISITES FOR EXPT. : Definition of Multiplexer, Implementation and operation of Mux using logic gates, Operation of Multiplexer IC-74LS153. (Refer Data-Sheet)

OBJECTIVE :

1. Verification of 4:1 MUX using IC-74LS153.
2. Design and Implement 8:1 MUX using IC-74LS153 & Verify its Truth Table.
3. Design & Implement the given3 Variable function using 8:1 MUX. & Verify its Truth-Table.
   $f(A,B,C) = \sum_M (0,2,4,6)$
4. Design & Implement the given 4 variable function using 8:1 MUX & Verify its Truth-Table.
   $f(A,B,C,D) = \sum_M (1,2,5,6,8,10,14,15)$

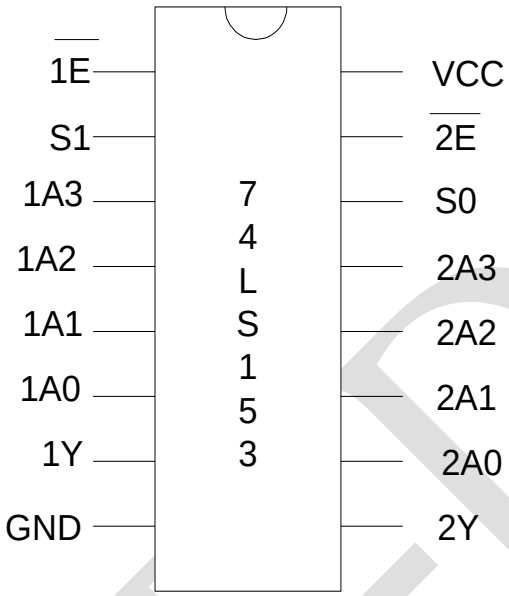
APPARATUS :

Digital-Board, GP-4Patch-Cords, IC-74LS153, IC-74LS32, IC-74LS00 / IC-74LS04. and Required Logic gates if any.

THEORY : Multiplexers are very useful components in digital systems. They transfer a large number of information units over a smaller number of channels, (usually one channel) under the control of selection signals. Multiplexer means many to one. A multiplexer is a circuit with many inputs but only one output. By using control signals (select lines) we can select any input to the output. Multiplexer is also called as data Selector because the output bit depends on the input data bit that is selected. The general multiplexer circuit has 2^m input signals, m control/select signals and 1 output signal. IC-74LS153 is Dual 4:1 MUX. It is a 16-pin dual packaged IC, which has two independent 4:1 mux with separate

enable pins (STROBE Active Low). One can design 8:1 MUX by cascading available Two 4:1 MUX of IC-74LS153.

PIN Diagram :

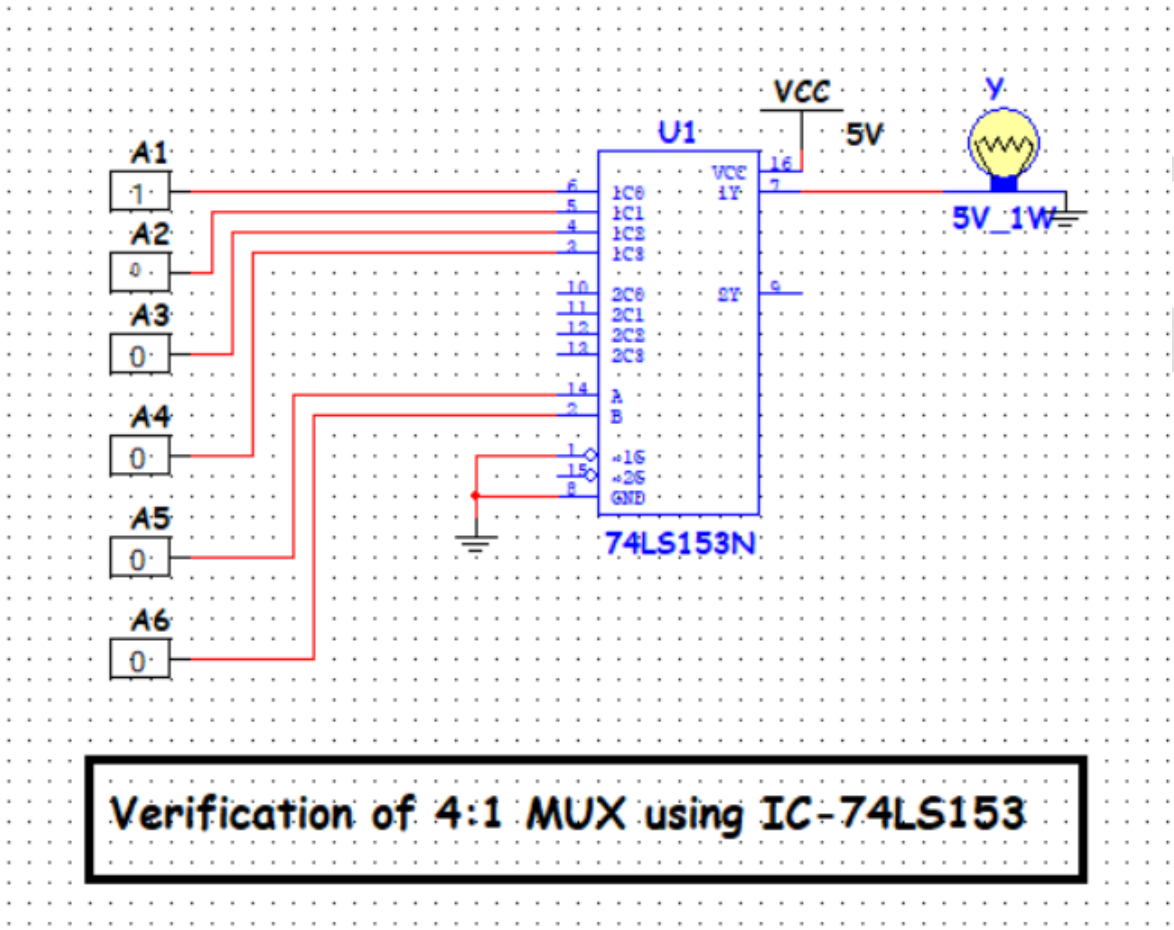


PROCEDURE :

1. Check all the components for their working.
2. Insert the appropriate IC into the IC base.
3. Make connections as per the logic diagram design .
4. Verify the Truth Table and observe the outputs.

Logic Diagram:

1. Diagram: (4:1 MUX.)

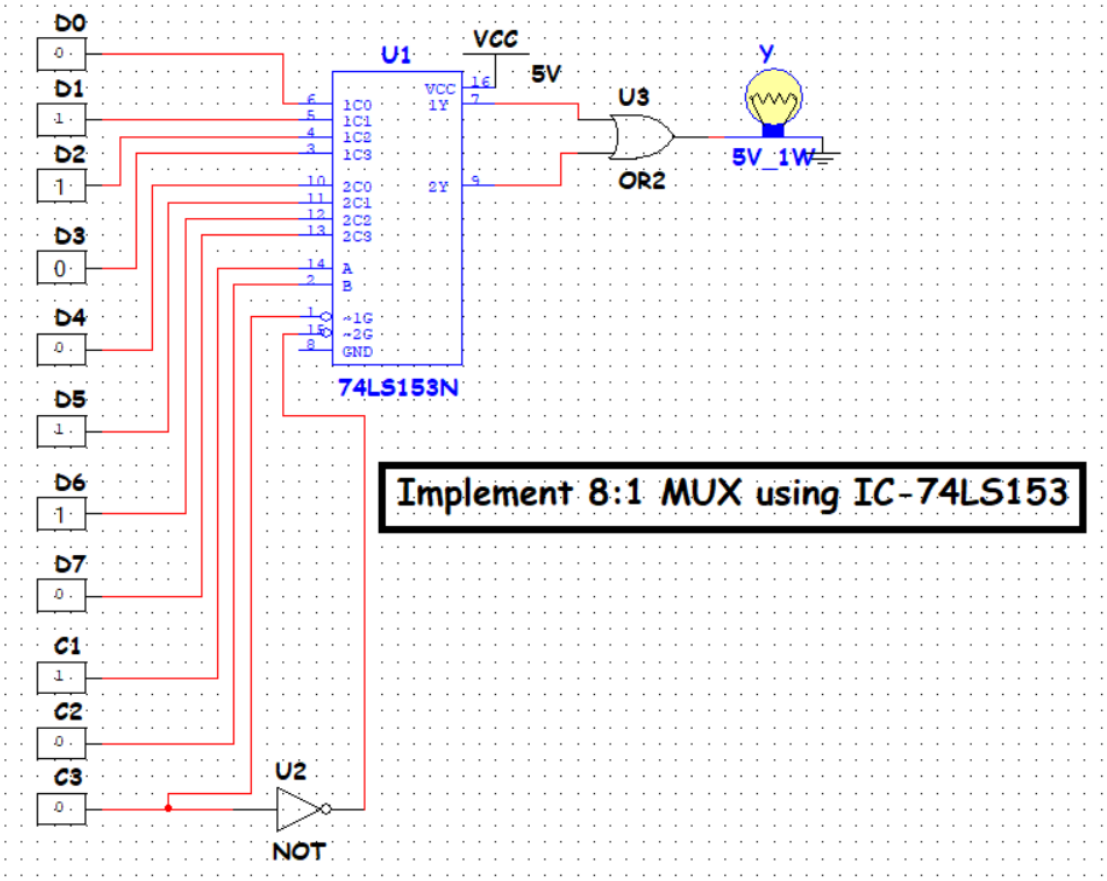


TRUTH-TABLE:

Truth-Table 1: (for 4:1 MUX.)

A	B	Y
0	0	Y0
0	1	Y1
1	0	Y2
1	1	Y3

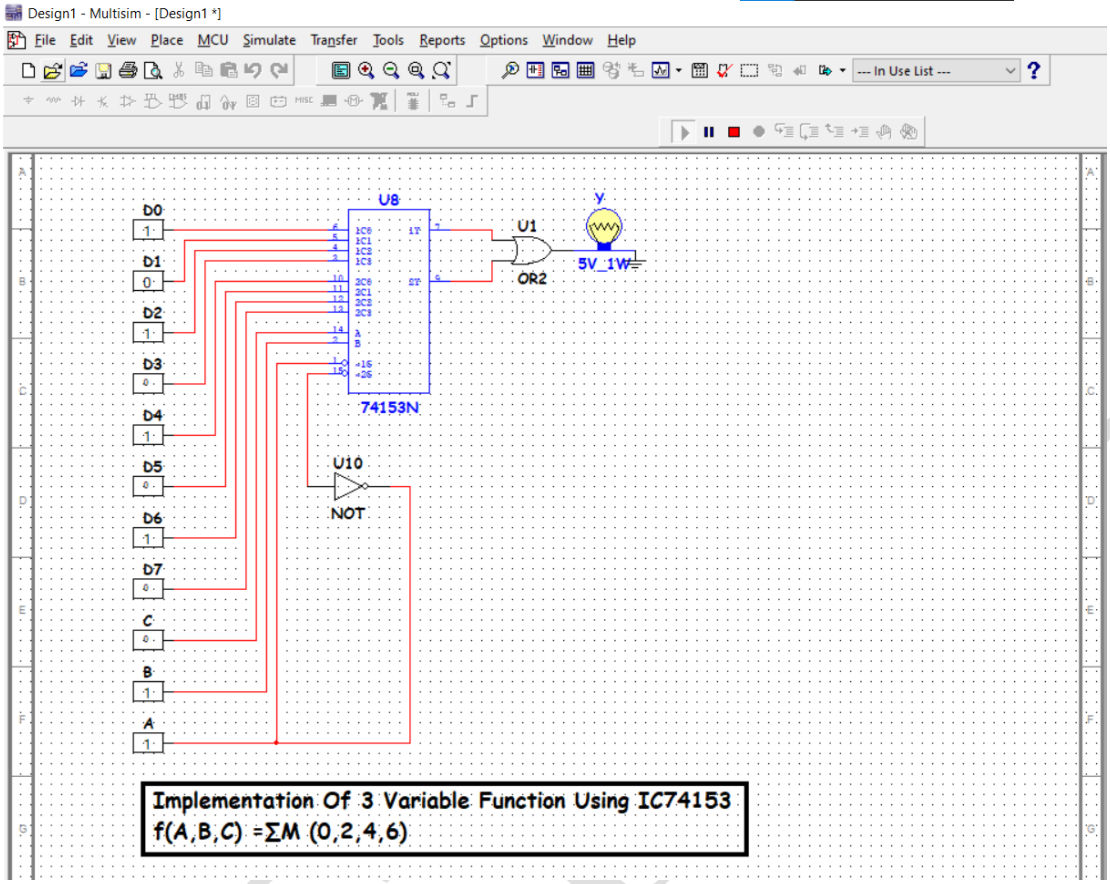
2. Diagram: (8:1 MUX.using Two 4:1 MUX.)



Truth-Table 2: (for 8:1 MUX.using Two 4:1 MUX.)

S_2	S_1	S_0	Y
0	0	0	D_0
0	0	1	D_1
0	1	0	D_2
0	1	1	D_3
1	0	0	D_4
1	0	1	D_5
1	1	0	D_6
1	1	1	D_7

3. Diagram: (Implementation of Given function using 8:1 MUX.)



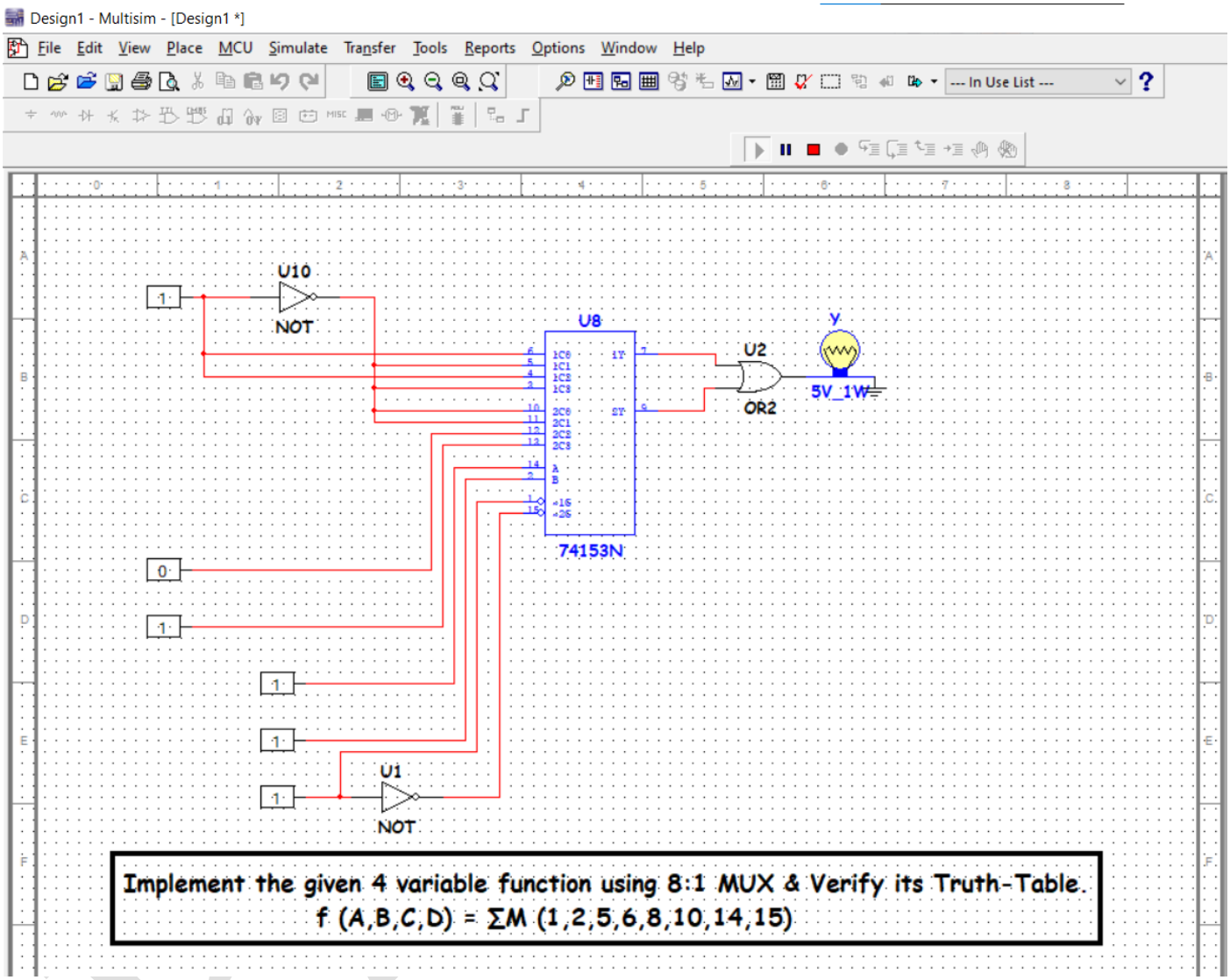
Truth-Table

A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

4: (Design 4 variable function using 8:1 MUX)

A	B	C	D	Y	Variable Reduction
0	0	0	0	0	D
0	0	0	1	1	
0	0	1	0	1	D′
0	0	1	1	0	
0	1	0	0	0	D
0	1	0	1	1	
0	1	1	0	1	D′
0	1	1	1	0	
1	0	0	0	1	D′
1	0	0	1	0	
1	0	1	0	1	D′
1	0	1	1	0	
1	1	0	0	0	0
1	1	0	1	0	
1	1	1	0	1	1
1	1	1	1	1	

Diagram: (Implementation of Given Function using 8:1 MUX.)

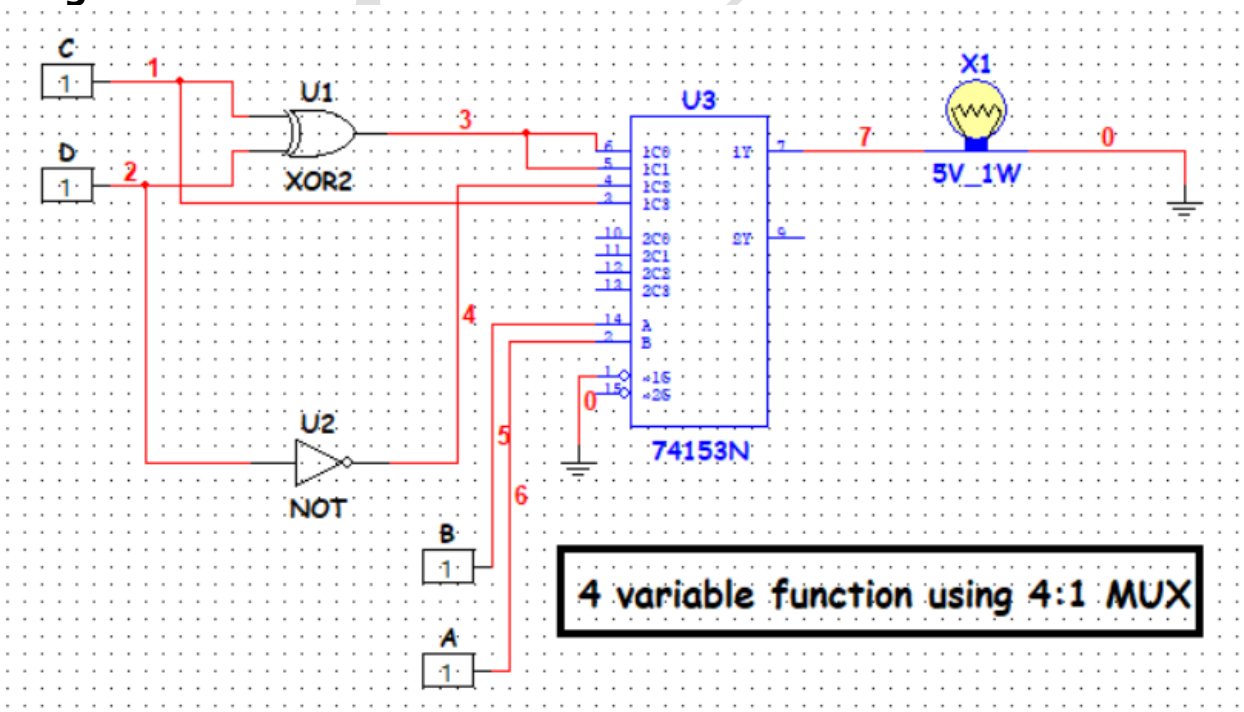


5)Design 4 variable function using 4:1 MUX

f (A,B,C,D) = $\sum_M$ (1,2,5,6,8,10,14,15)

A	B	C	D	Y	
0	0	0	0	C xor D	0
0	0	0	1		1
0	0	1	0	C xor D	1
0	0	1	1		0
0	1	0	0	C xor D	0
0	1	0	1		1
0	1	1	0	C xor D	1
0	1	1	1		0
1	0	0	0	D’	1
1	0	0	1		0
1	0	1	0	D’	1
1	0	1	1		0
1	1	0	0	C	0
1	1	0	1		0
1	1	1	0	C	1
1	1	1	1		1

Diagram:



CONCLUSION :

Truth table of 4:1 MUX verified.

Implementation of 8:1 MUX with the help of two 4:1 MUX done sucessfully

Implementation of given equation function with the help of 8:1 MUX done successfully

Sucessfully implemented given 4 variable function by 8:1 MUX

Sucessfully implemented given 4 variable function by 4:1 MUX

REFFRENCE:

1) : R.P. Jain , "Modern digital electronics" 3rd edition

2) : A. Anand Kumar, "Fundamentals of digital circuits" 1st edition

Subject teacher Sign with Date Remark