CSE 1326: Digital Logic Design Lab
Multiplexers
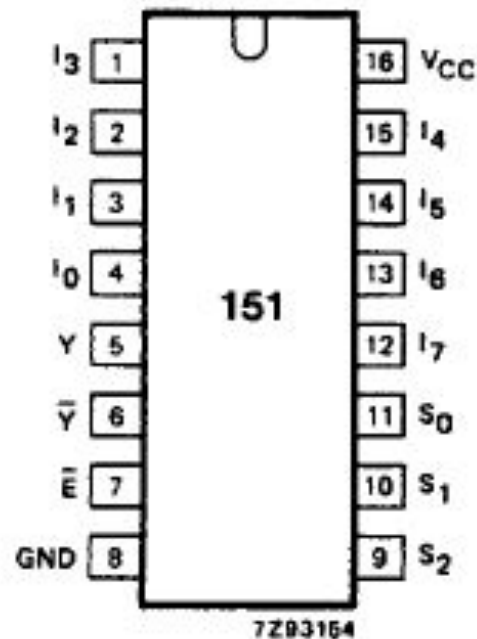
United International University

Objective

- **Study** 4-input and 8-input multiplexers (MUX)

- **Application**: Design and implement the Boolean Function

  - $F(A,B,C) = \sum_m (0,1, 4, 7) = \sum_m (1, 3, 4, 6)$

  Using

  1. 8 input MUX and necessary basic gates
 2. 4 input MUX and necessary basic gates

74151: 8-input multiplexer

PIN NO.	SYMBOL	NAME AND FUNCTION
4, 3, 2, 1, 15, 14, 13, 12	I_0 to I_7	multiplexer inputs
5	Y	multiplexer output
6	$\overline{Y}$	complementary multiplexer output
7	$\overline{E}$	enable input (active LOW)
8	GND	ground (0 V)
11, 10, 9	S_0, S_1, S_2	select inputs
16	V_{CC}	positive supply voltage


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I3  [1]            [16]  VCC
I2  [2]            [15]  I4
I1  [3]            [14]  I5
I0  [4]    151     [13]  I6
Y   [5]            [12]  I7
Ȳ   [6]            [11]  S0
Ē   [7]            [10]  S1
GND [8]            [9]   S2
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74153: Dual 4-input multiplexer

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 15	$1\overline{E}$, $2\overline{E}$	output enable inputs (active LOW)
14, 2	S_0, S_1	common data select inputs
6, 5, 4, 3	$1I_0$ to $1I_3$	data inputs from source 1
7	1Y	multiplexer output from source 1
8	GND	ground (0 V)
9	2Y	multiplexer output from source 2
10, 11, 12, 13	$2I_0$ to $2I_3$	data inputs from source 2
16	V_{CC}	positive supply voltage

7Z93124

7Z93125
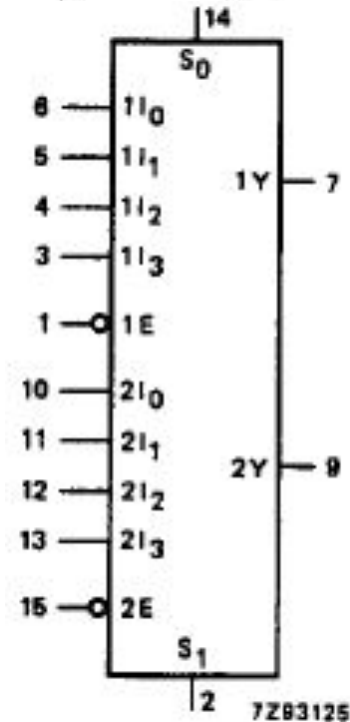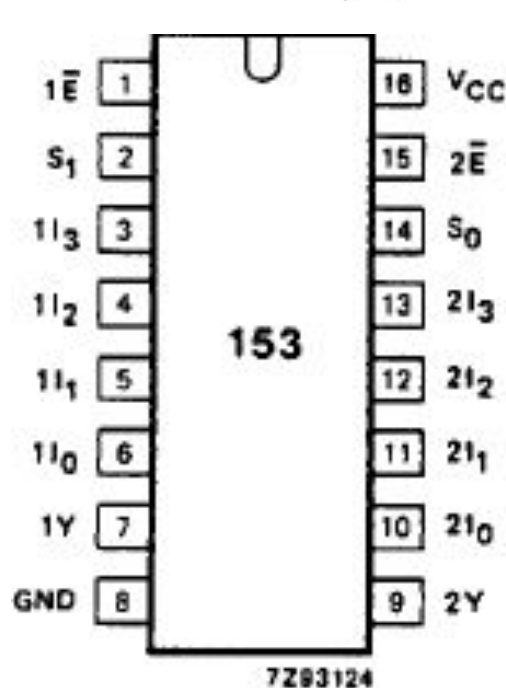
What to do (1)

• Implement $F(A,B,C) = \sum_m (0, 1, 4, 7)$ using 8-input multiplexer

A	B	C	F
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

MUX 8:1

C —— 0
B —— 1
A —— 2

—— 0
—— 1
—— 2 —— F
—— 3
—— 4
—— 5
—— 6
—— 7

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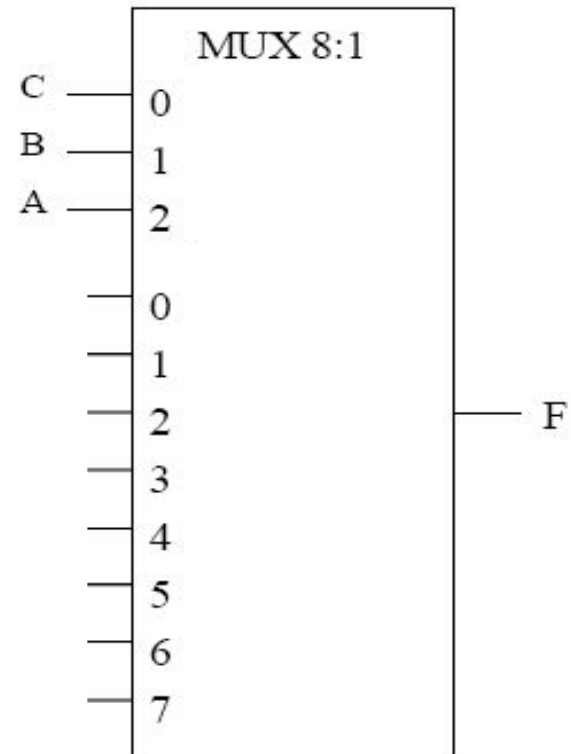
What to do (2)

• Implement $F(A,B,C) = \sum_m (0, 1, 4, 7)$ using 4-input multiplexer

A	B	C	F
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

A S_1 4X1 MUX
B S_0

0
1   Y —— F
2
3

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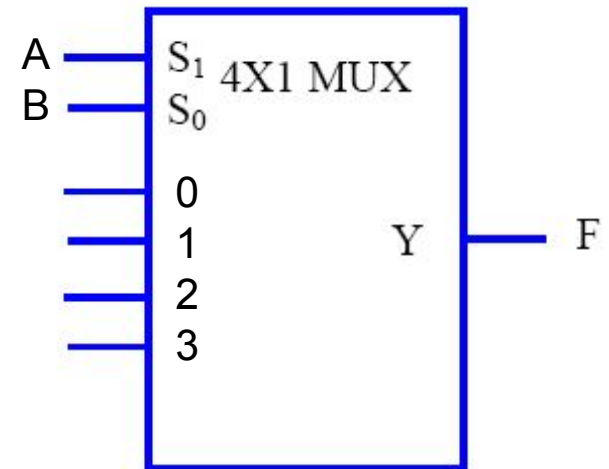
Writing Report

- Provide pin diagram of 74151 and 74153.

- Circuit diagram of implementation of $F(A,B,C) = \sum_m (1, 3, 4, 6)$ using 4 input MUX and necessary basic gates

- Truth table, input functions, and circuit diagram of implementation of the function $F(A,B,C) = \sum_m (1, 3, 4, 6)$ using 2-to-1 MUX and necessary basic gates.