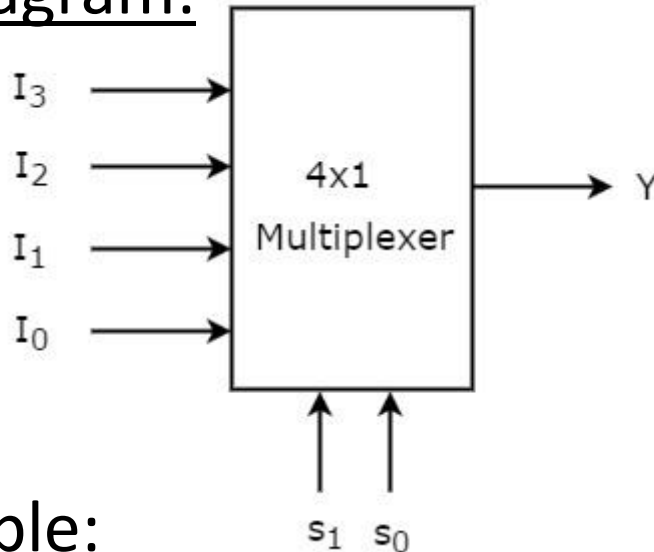


# Multiplexer

- Multiplexer means transmitting a large number of information units over a smaller number of channels or lines.
- A digital multiplexer is a combinational circuit that selects binary information from one of many input lines and directs it to a single output line.
- Generally, there are  $2^n$  input lines and  $n$  selection lines whose bit combinations determine which input is selected.

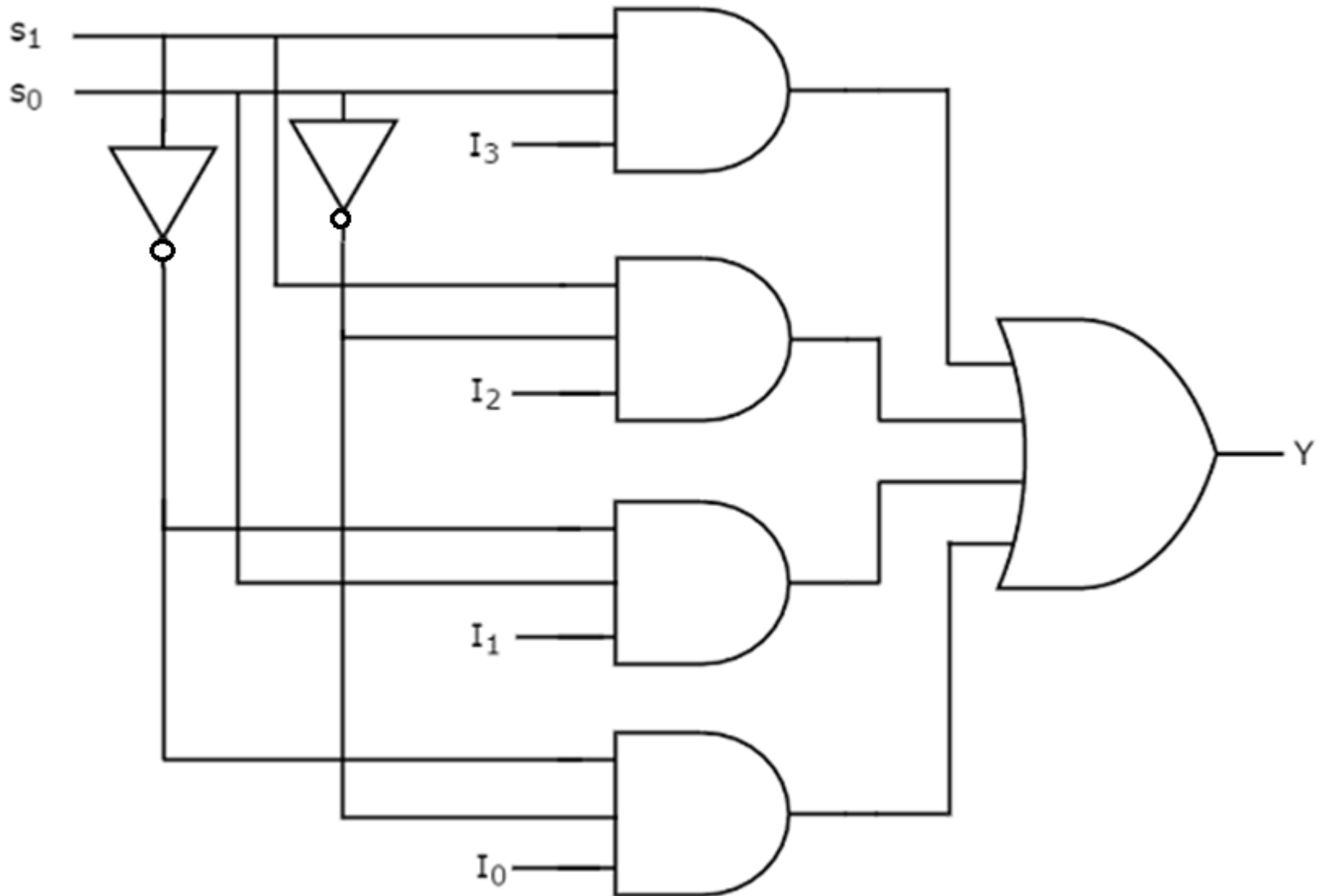
- Block Diagram:



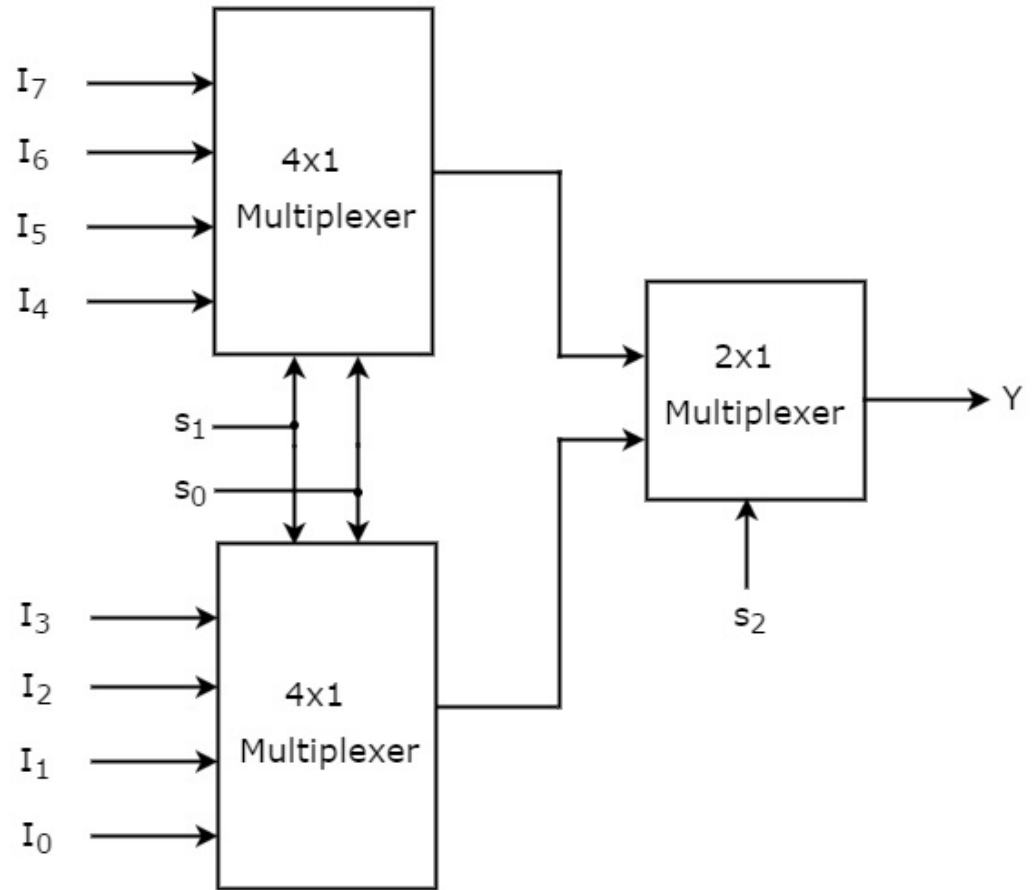
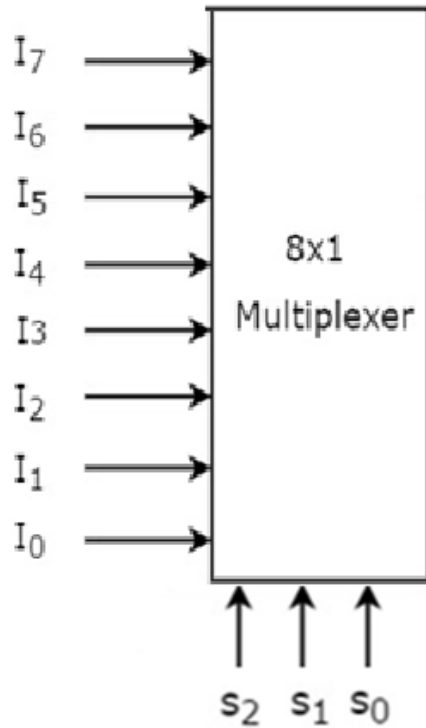
- Truth Table:

$s_0$	$s_1$	$Y$
0	0	$I_0$
0	1	$I_1$
1	0	$I_2$
1	1	$I_3$

# Multiplexer



# Multiplexer using Multiplexers

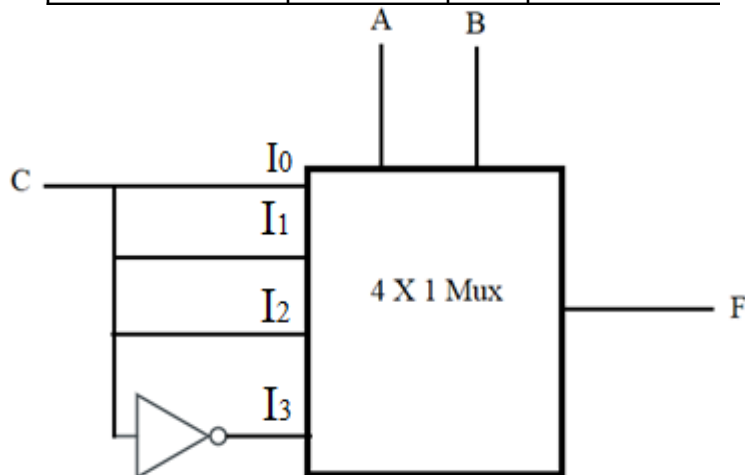


# Circuits Using Multiplexer

- Implement the following boolean function using multiplexer:

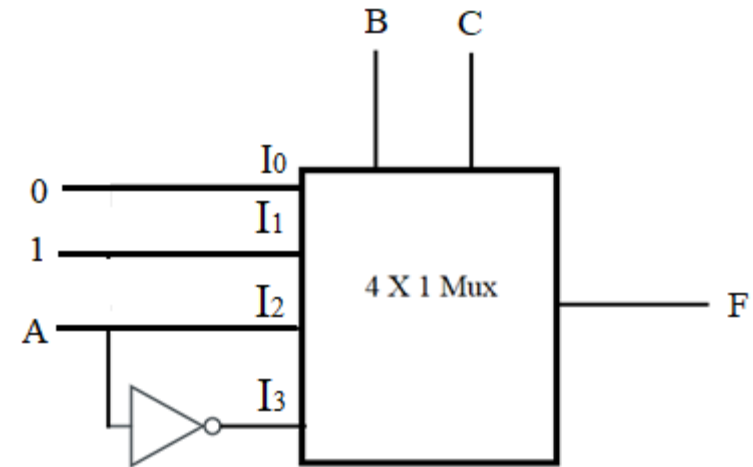
–  $F(A,B,C) = \sum(1,3,5,6)$

Minterms	A B C	F	
0	0 0 0	0	F=C
1	0 0 1	1	
2	0 1 0	0	F=C
3	0 1 1	1	
4	1 0 0	0	F=C
5	1 0 1	1	
6	1 1 0	1	F=C'
7	1 1 1	0	



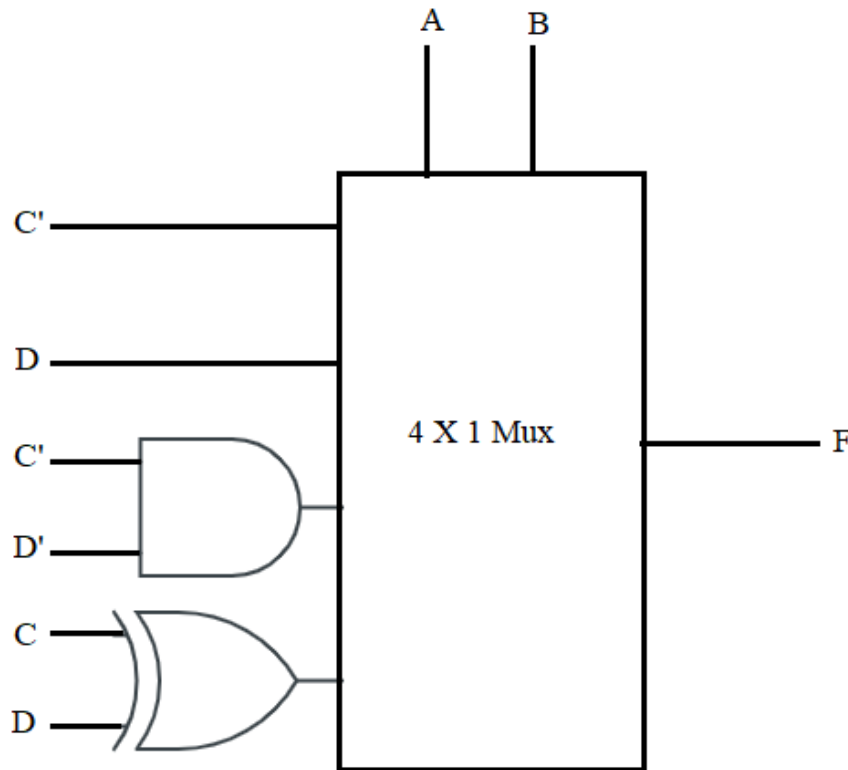
Minterms	A B C	F
0	0 0 0	0
1	0 0 1	1
2	0 1 0	0
3	0 1 1	1
4	1 0 0	0
5	1 0 1	1
6	1 1 0	1
7	1 1 1	0

	$I_0$	$I_1$	$I_2$	$I_3$
$A'$	0	1	2	3
$A$	4	5	6	7
	0	1	A	$A'$



# Circuits Using Multiplexer

- Implement the following boolean function using 4X1 multiplexer and external gates:
  - $F(A,B,C,D) = \sum(0,1,5,7,8,13,14)$

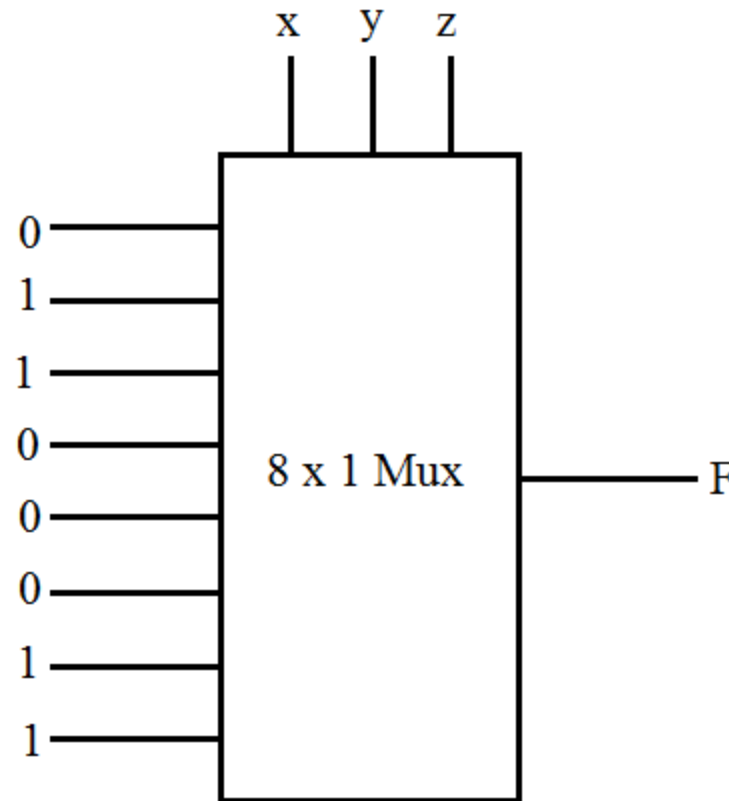


Minterms	A B C D	F	
0	0 0 0 0	1	$F = C'D' + C'D$ $= C'(D' + D)$ $= C'$
1	0 0 0 1	1	
2	0 0 1 0	0	
3	0 0 1 1	0	
4	0 1 0 0	0	$F = C'D + CD$ $= D(C' + C)$ $= D$
5	0 1 0 1	1	
6	0 1 1 0	0	
7	0 1 1 1	1	
8	1 0 0 0	1	$F = C'D'$
9	1 0 0 1	0	
10	1 0 1 0	0	
11	1 0 1 1	0	
12	1 1 0 0	0	$F = C'D + CD'$ $= C \oplus D$
13	1 1 0 1	1	
14	1 1 1 0	1	
15	1 1 1 1	0	

# Circuits Using Multiplexer

- Implement the following boolean function using 8X1 multiplexer:
  - $F(x,y,z) = \sum(1,2,6,7)$

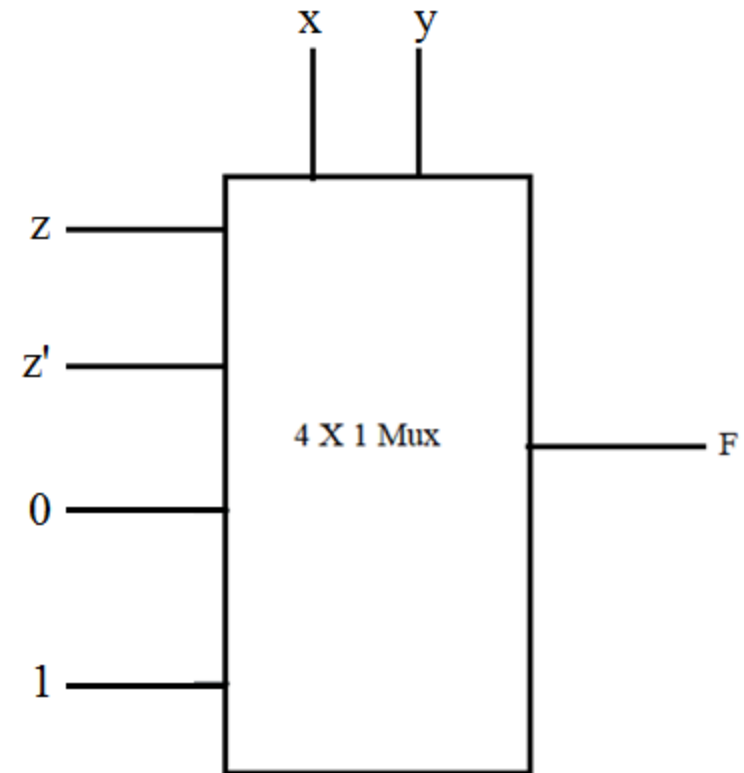
Minterms	x y z	F
0	0 0 0	0
1	0 0 1	1
2	0 1 0	1
3	0 1 1	0
4	1 0 0	0
5	1 0 1	0
6	1 1 0	1
7	1 1 1	1



# Circuits Using Multiplexer

- Implement the following boolean function using 4X1 multiplexer:
  - $F(x,y,z) = \sum(1,2,6,7)$

Minterms	x y z	F	
0	0 0 0	0	$F=z$
1	0 0 1	1	
2	0 1 0	1	$F=z'$
3	0 1 1	0	
4	1 0 0	0	$F=0$
5	1 0 1	0	
6	1 1 0	1	$F=1$
7	1 1 1	1	



# Circuits Using Multiplexer

- Implement the following boolean function using 4X1 multiplexer:
  - $F(x,y,z) = \sum(1,2,6,7)$

Minterms	x y z	F	
0	0 0 0	0	$F = y'z + yz'$ $= y \oplus z$
1	0 0 1	1	
2	0 1 0	1	
3	0 1 1	0	
4	1 0 0	0	$F = yz' + yz$ $= y(z' + z)$ $= y$
5	1 0 1	0	
6	1 1 0	1	
7	1 1 1	1	

