

n selection lines, 2^n inputs

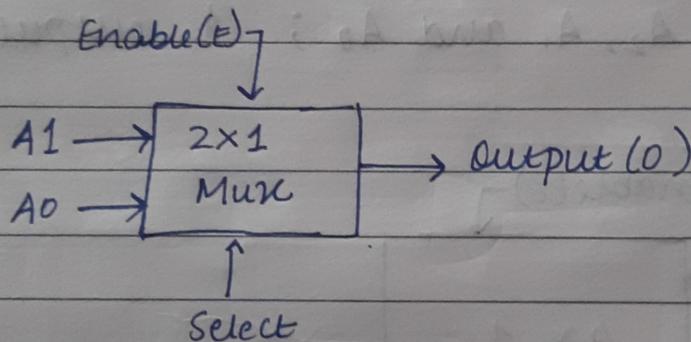
Multiplexers. Multiplexer is a combinational circuit that has 2^n input lines and a single output line.

Multiplexer is a multi-input and single-output combinational circuit.

Multiplexer is also treated as MUX

2X1 Multiplexer. 1 selection line, so, one output Y and 2 inputs A_1 and A_0

Block Diagram:



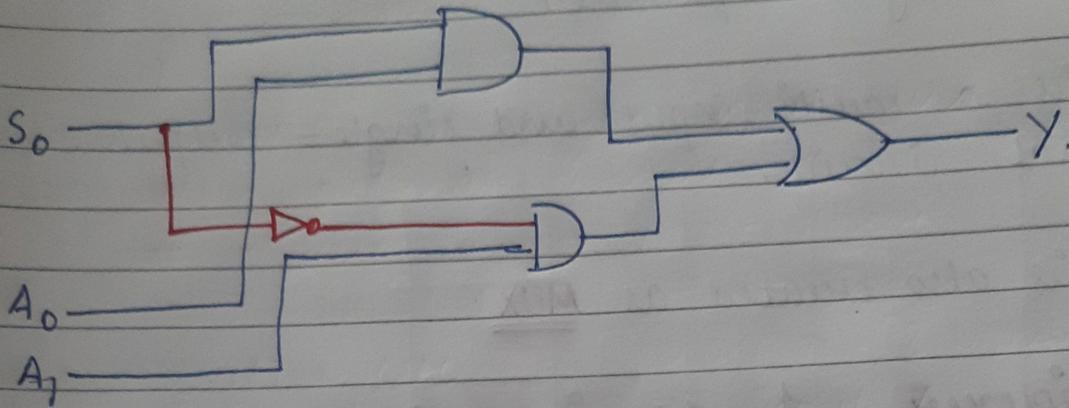
Truth Table:

S_0	Y
0	A_0
1	A_1

Logical eqⁿ :

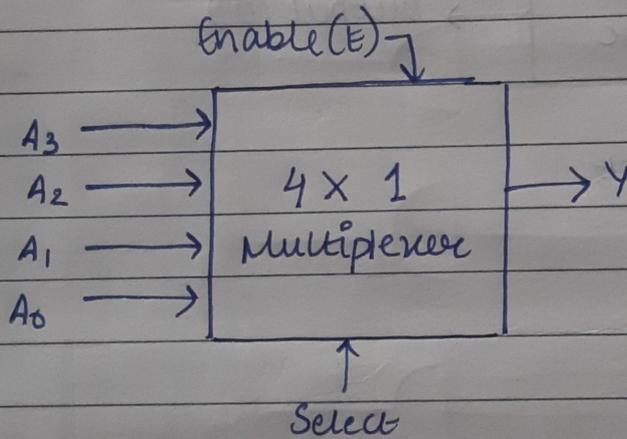
$$Y = S_0' A_0 + S_0 A_1$$

Logic circuit:



4X1 Multiplexer 2 selection lines S_0, S_1 , 4 inputs A_3, A_2, A_1 and A_0 ; 1 output Y

Block diagram:



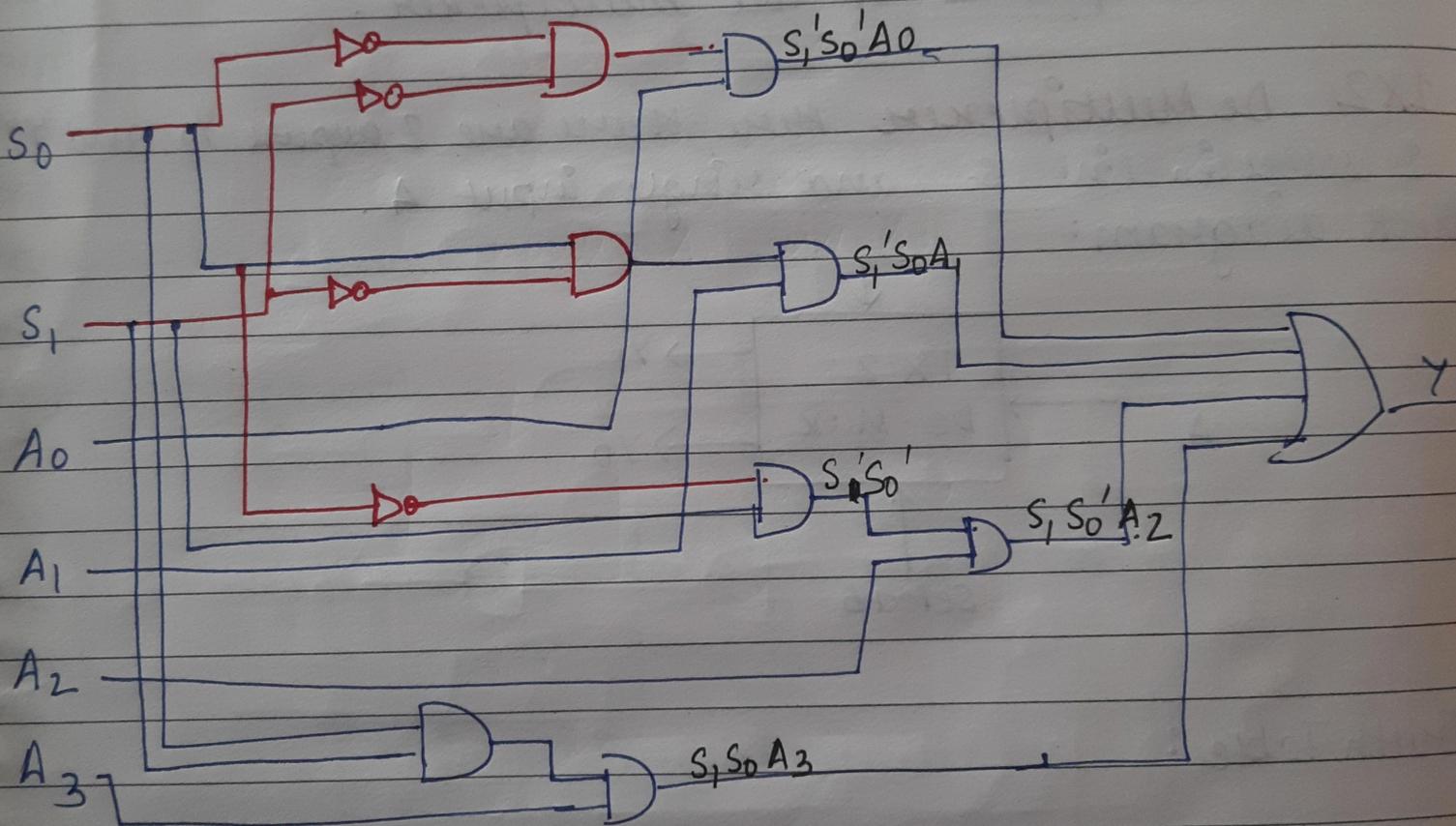
Truth Table:

Inputs		Output
S_1	S_0	Y
0	0	A_0
0	1	A_1
1	0	A_2
1	1	A_3

Logic equation :

$$Y = S_1' S_0' A_0 + S_1' S_0 A_1 + S_1 S_0' A_2 + S_1 S_0 A_3$$

Logic circuit :



n selection lines ; 2^n 2 outputs

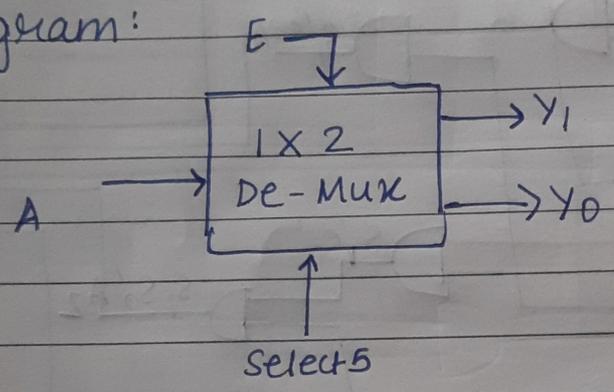
De-Multiplexers. A de multiplexer is a combinational circuit that has 1 input line and 2^n output lines.

De-multiplexer is a single input and multi output combinational circuit.

It is ~~the~~ opposite to the multiplexer.

1X2 De Multiplexer Here, there are 2 outputs Y_0 and Y_1 , 1 selection line S_0 and single input A.

Block diagram:



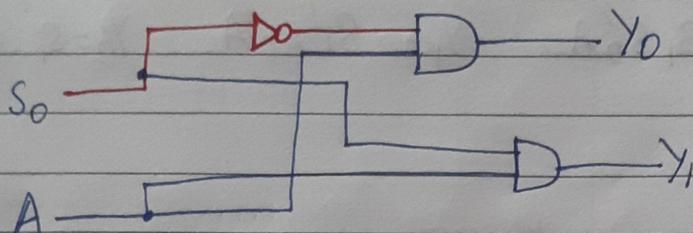
Truth Table :

Input	Output	
S_0	Y_1	Y_0
0	0	A
1	A	0

Logic equations :

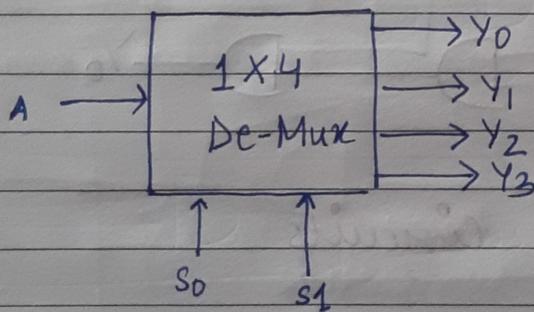
$$Y_0 = S_0' \cdot A$$
$$Y_1 = S_0 \cdot A$$

logic circuit :



1X4 De-Multiplexer Here, there are 4 outputs Y_0, Y_1, Y_2 and Y_3 , 2 selection lines S_0 and S_1 and 1 input A

block diagram.



Truth Table

Inputs		Output			
S_0	S_1	Y_3	Y_2	Y_1	Y_0
0	0	0	0	0	A
0	1	0	0	A	0
1	0	0	A	0	0
1	1	A	0	0	0

Logic eqⁿ:

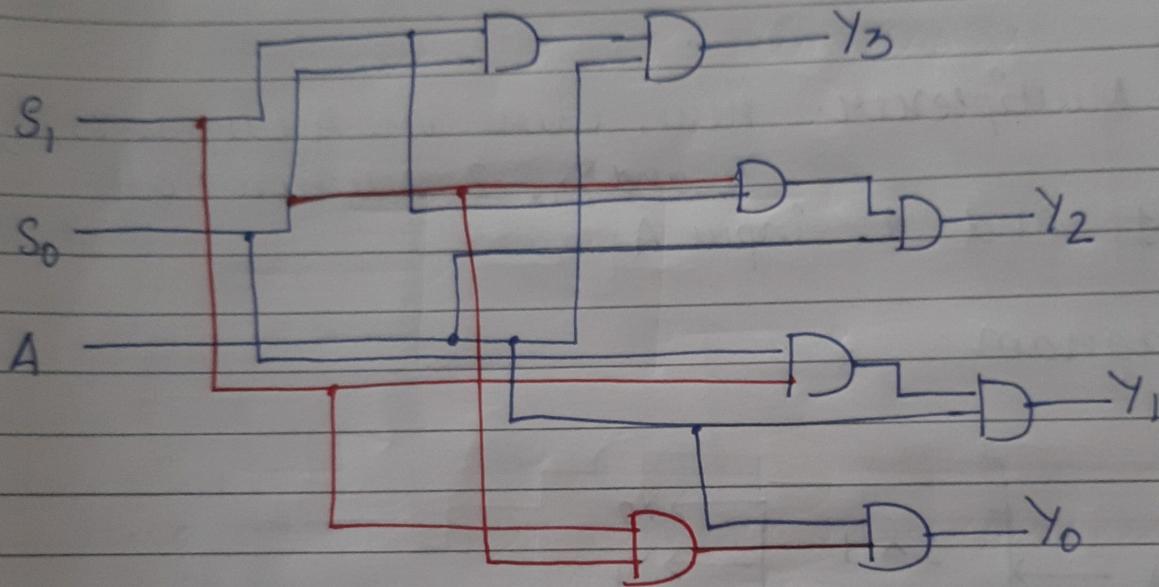
$$Y_3 = S_1 S_0 A$$

$$Y_2 = S_1 S_0' A$$

$$Y_1 = S_1' S_0 A$$

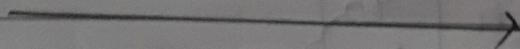
$$Y_0 = S_1' S_0' A$$

Logic circuit



Sequential Circuits

diff b/w combinational and sequential circuits



A	0	0	0
B	0	0	0
C	0	0	0
D	0	0	0