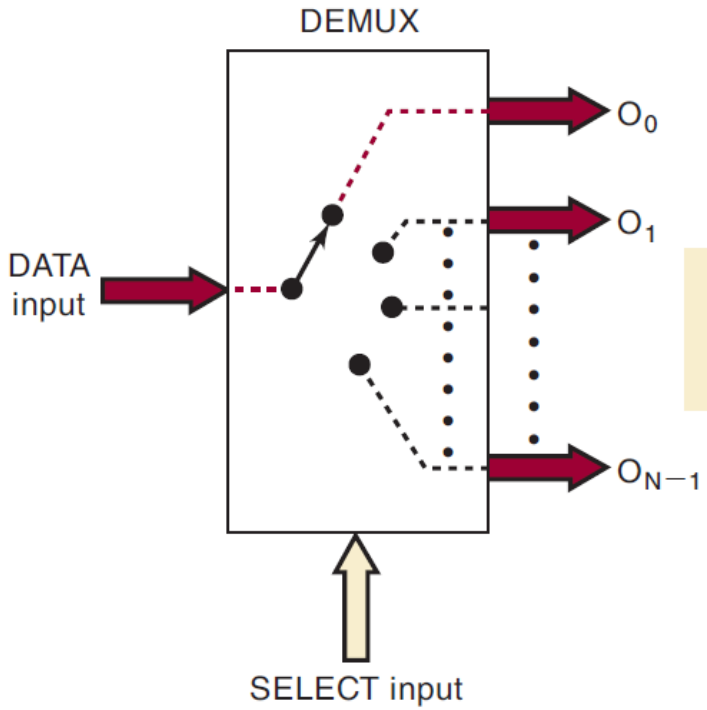
DEMULTIPLEXER CIRCUIT

- A demultiplexer circuit performs the opposite operations of multiplexer circuit.
- It takes one input and distributes it over several outputs.



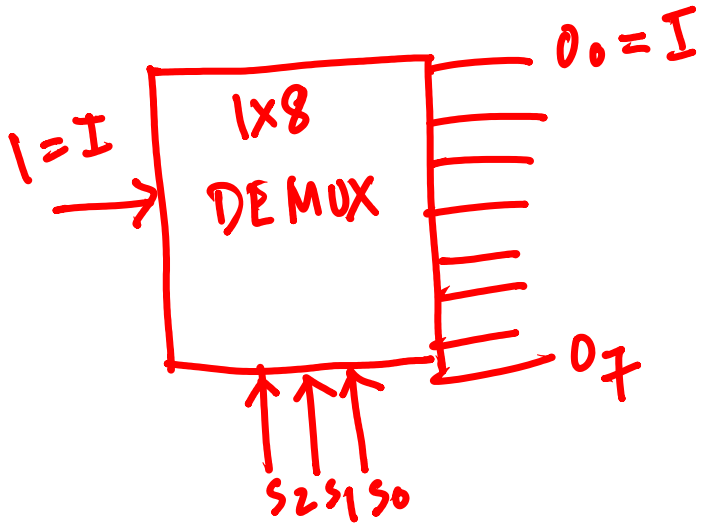
DATA input is transmitted to only one of the outputs as determined by select input code.

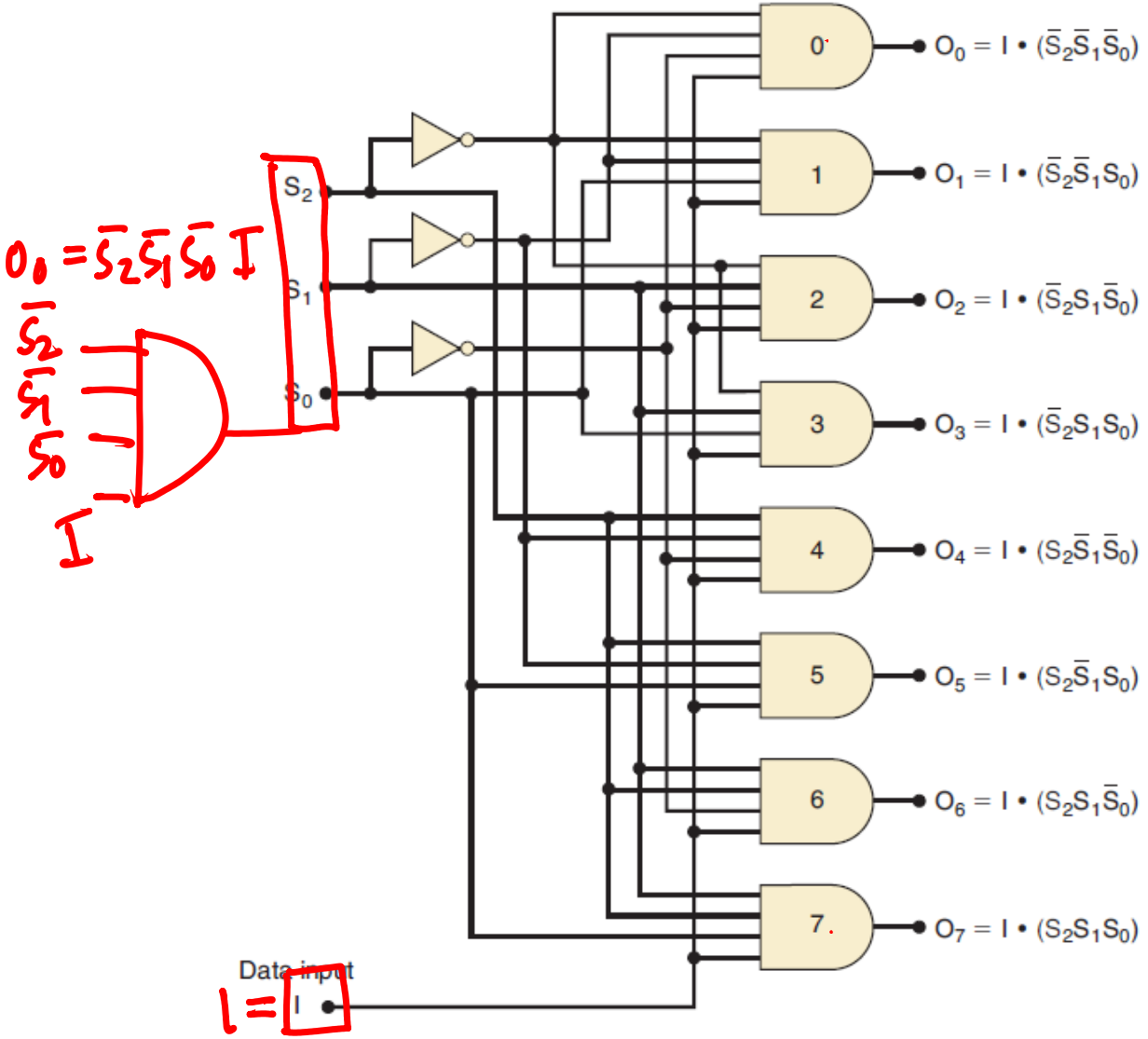
Ref (1): pp 693

DEMULTIPLEXER CIRCUIT

- 1-Line-to-8-Line Demultiplexer:

Select Code			Outputs							
S_2	S_1	S_0	O_7	O_6	O_5	O_4	O_3	O_2	O_1	O_0
0	0	0	0	0	0	0	0	0	0	I
0	0	1	0	0	0	0	0	0	I	0
0	1	0	0	0	0	0	0	I	0	0
0	1	1	0	0	0	0	I	0	0	0
1	0	0	0	0	0	I	0	0	0	0
1	0	1	0	0	I	0	0	0	0	0
1	1	0	0	I	0	0	0	0	0	0
1	1	1	I	0	0	0	0	0	0	0

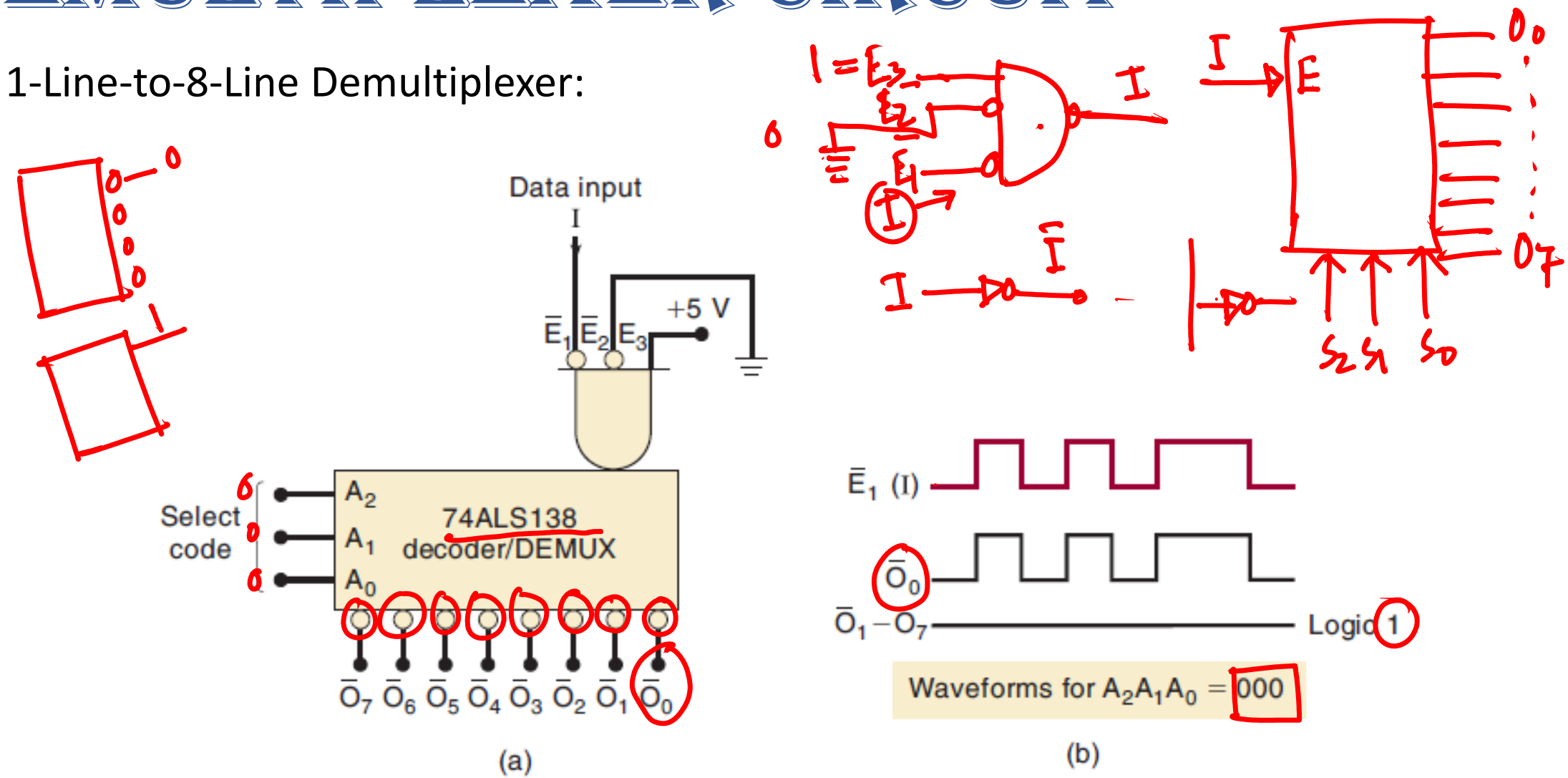




Ref (1): pp 694

DEMULTIPLEXER CIRCUIT

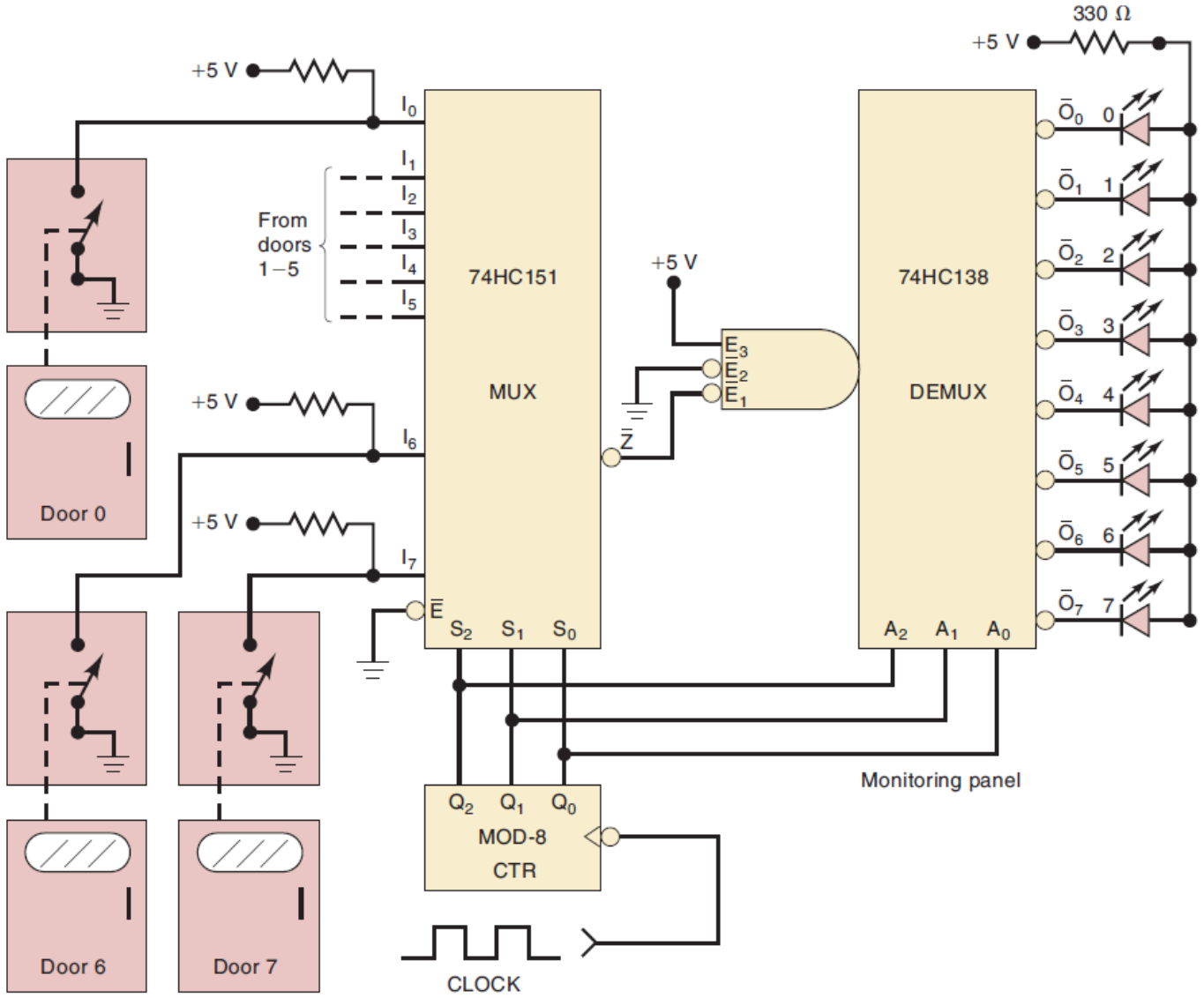
- 1-Line-to-8-Line Demultiplexer:



Ref (1): pp 695

DEMULTIPLEXER CIRCUIT

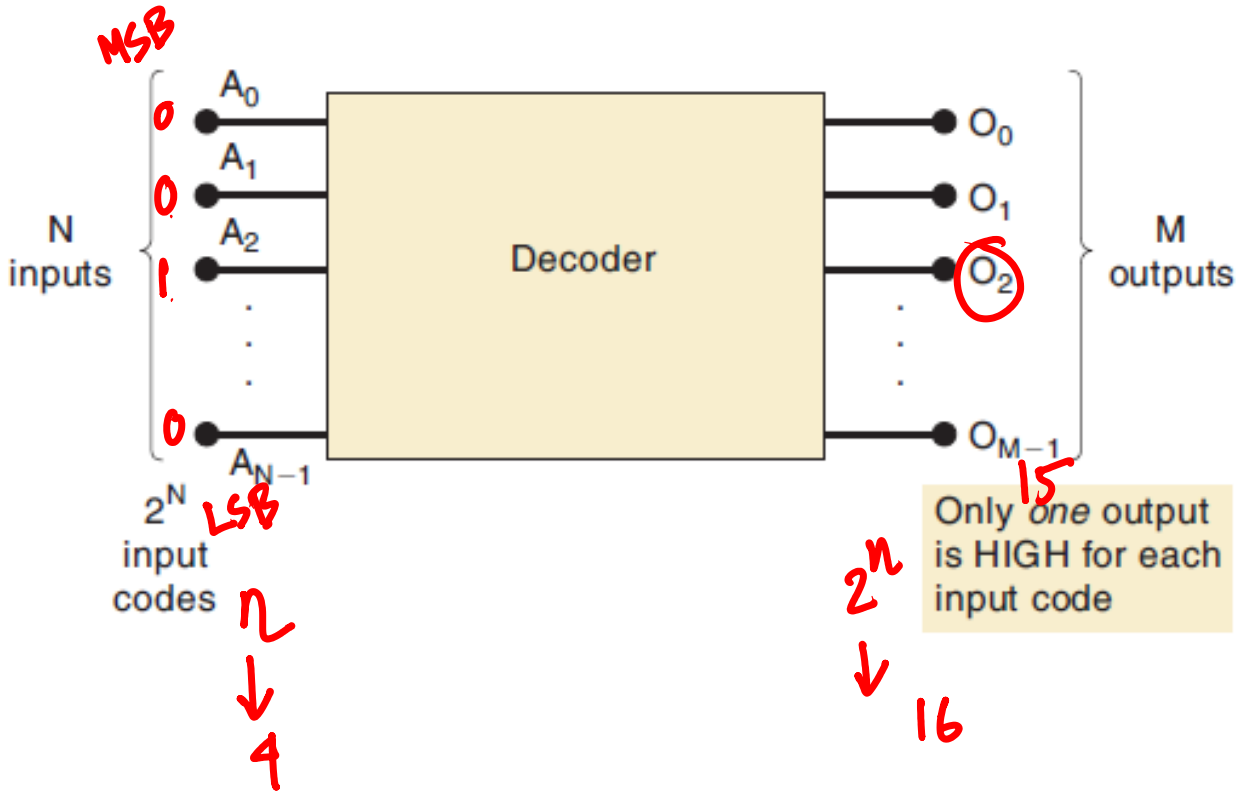
- Application:



Ref (1): pp 696

DECODER CIRCUIT

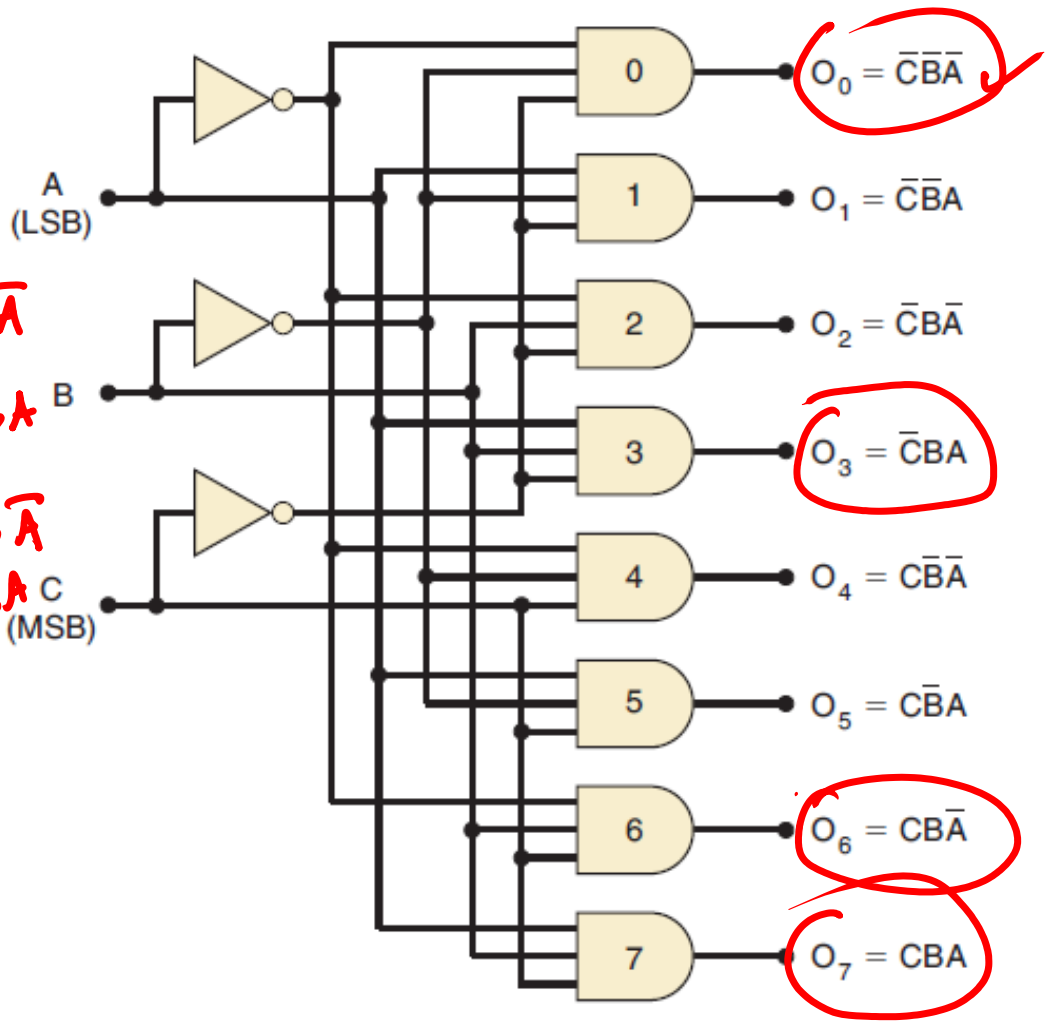
- A decoder receives a set of inputs representing a binary number and activates only the output that corresponds to that input number.



DECODER CIRCUIT

- 3-line-to-8-line decoder:

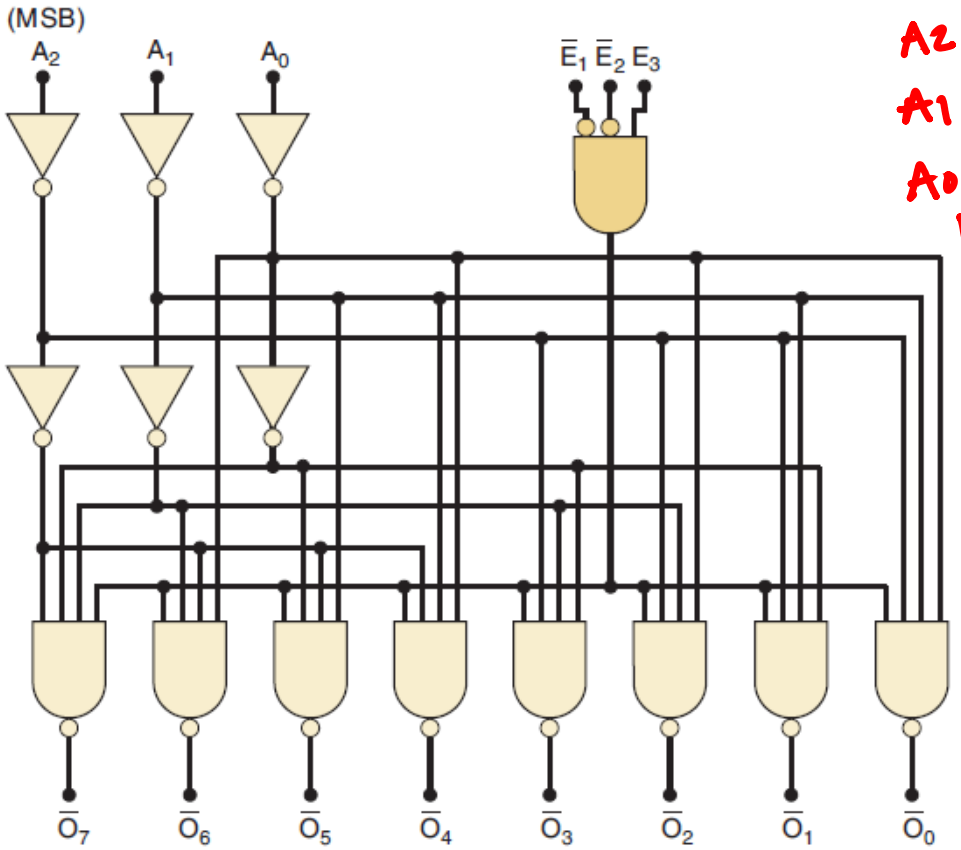
C	B	A	O_7	O_6	O_5	O_4	O_3	O_2	O_1	O_0	
0	0	0	0	0	0	0	0	0	0	1	$O_0 = \bar{C}\bar{B}\bar{A}$
0	0	1	0	0	0	0	0	0	1	0	
0	1	0	0	0	0	0	0	1	0	0	
0	1	1	0	0	0	0	1	0	0	0	$O_3 = \bar{C}BA$
1	0	0	0	0	0	1	0	0	0	0	
1	0	1	0	0	1	0	0	0	0	0	
1	1	0	0	1	0	0	0	0	0	0	$O_6 = CB\bar{A}$
1	1	1	1	0	0	0	0	0	0	0	$O_7 = CBA$

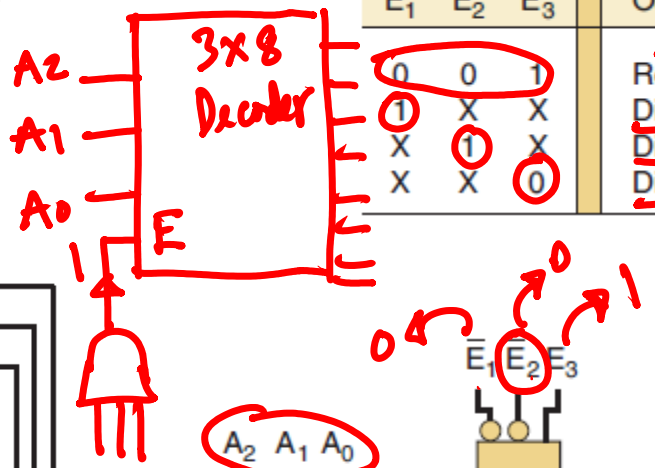


Ref (1): pp 661

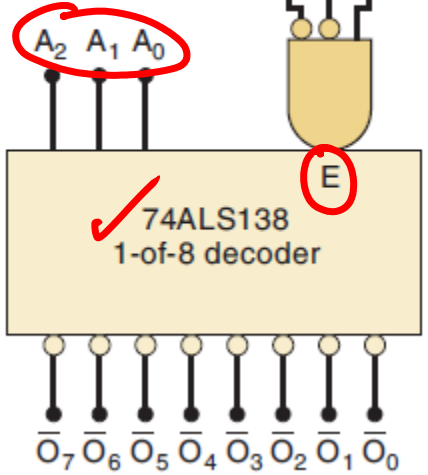
DECODER CIRCUIT

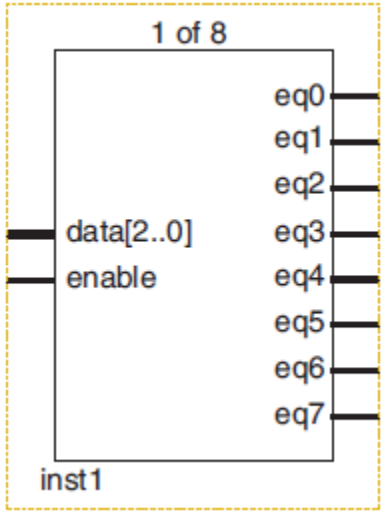
- 3-line-to-8-line decoder with enable input:





$\overline{E}_1$	$\overline{E}_2$	E_3	Outputs
0	0	1	Respond to input code $A_2A_1A_0$
1	X	X	Disabled – all HIGH
X	1	X	Disabled – all HIGH
X	X	0	Disabled – all HIGH

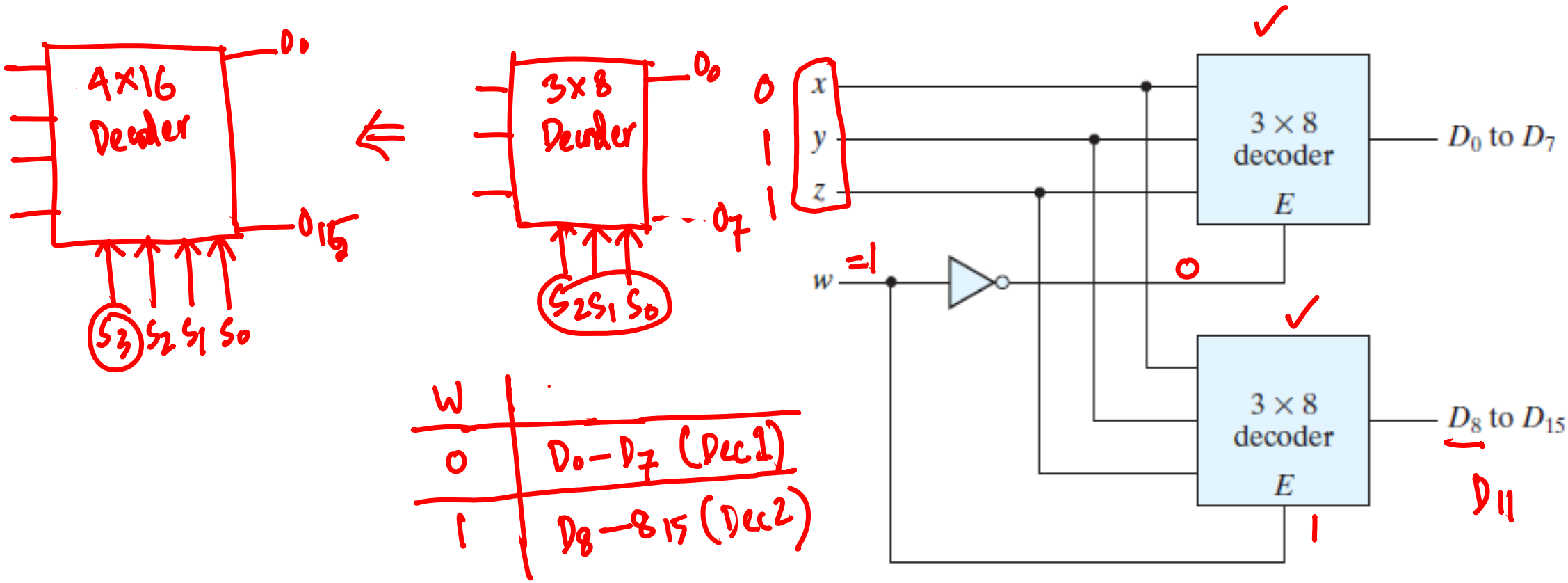




Ref (1): pp 662

DECODER CIRCUIT

- 4-line-to-16-line decoder with 3-line-to-8-line decoder :

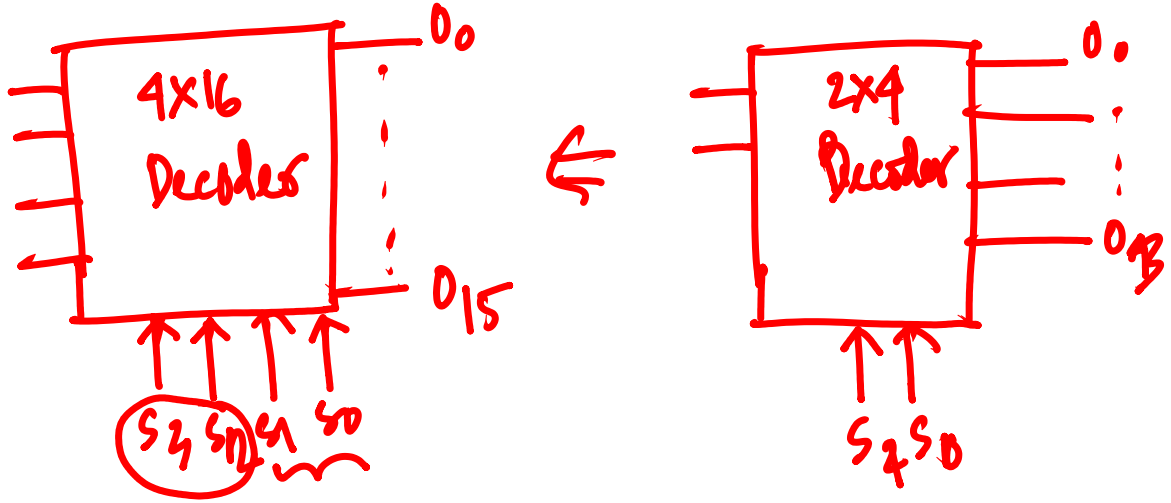


W	
0	$D_0 - D_7$ (Dec 1)
1	$D_8 - 8_{15}$ (Dec 2)

D_{11}

DECODER CIRCUIT

- 4-line-to-16-line decoder with decoder tree:



$W_3 = 1$, $W_2 = 0$, $W_1 = 1$, $W_0 = 0$

W_3	W_2	yz
0	0	y_0 → Dec1
0	1	y_1 → Dec2
1	0	y_2 → Dec3
1	1	y_3 → Dec4