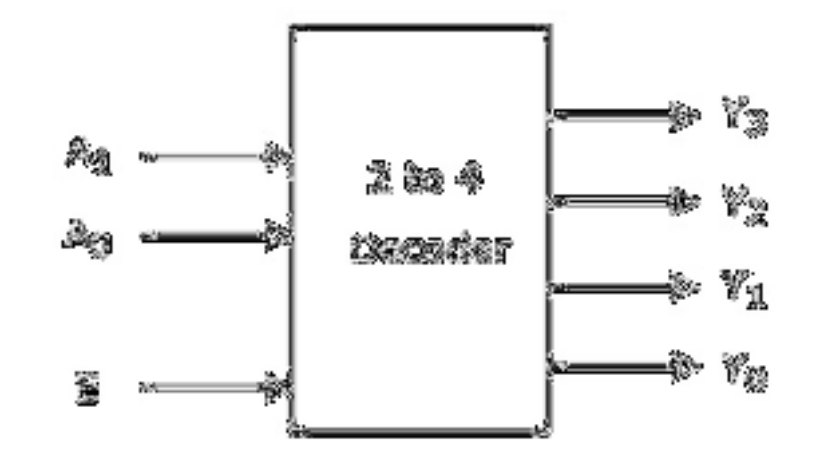
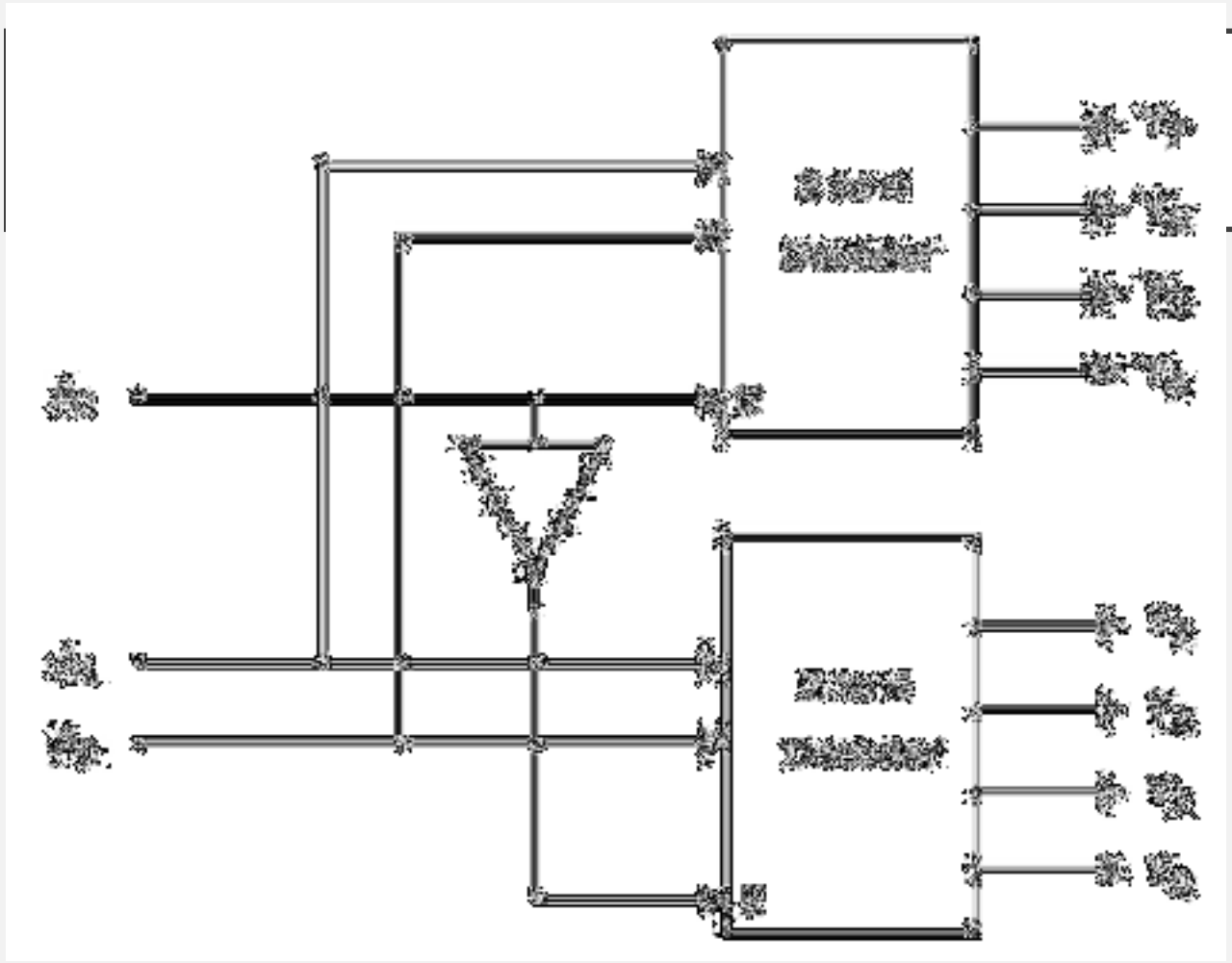
ENCODER, DECODER, MULTIPLEXER, DE MULTIPLEXER

- **Decoder** is a combinational circuit that has 'n' input lines and maximum of 2^n output lines.
- One of these outputs will be active High based on the combination of inputs present, when the decoder is enabled.
- That means decoder detects a particular code. The outputs of the decoder are nothing but the **min terms** of 'n' input variables (lines), when it is enabled.

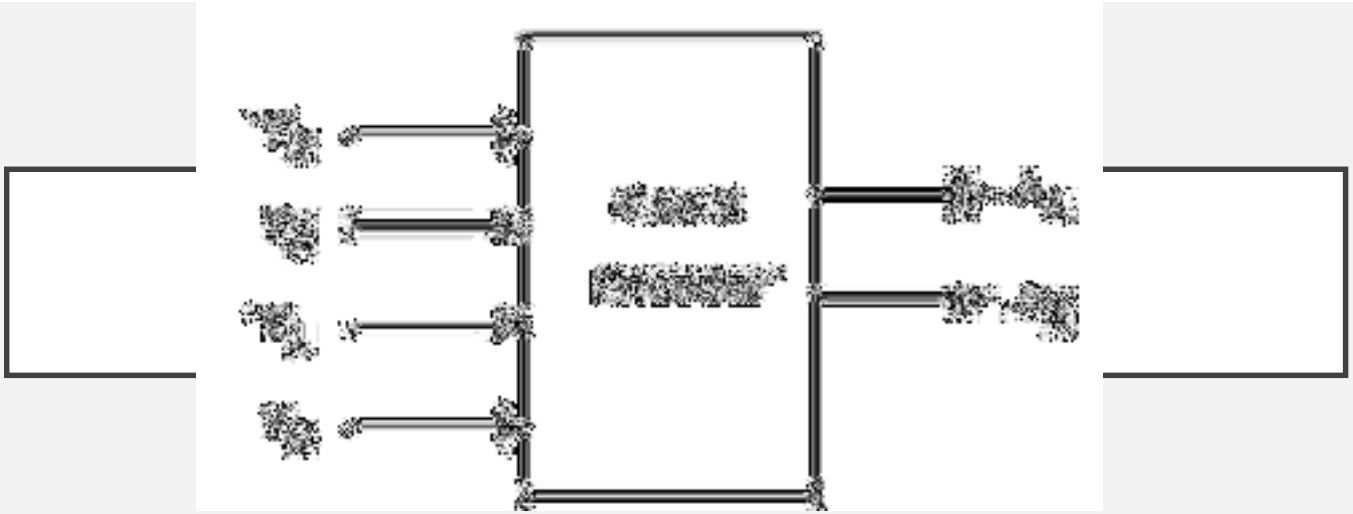


Enable	Inputs		Outputs			
E	A_1	A_0	Y_3	Y_2	Y_1	Y_0
0	x	x	0	0	0	0
1	0	0	0	0	0	1
1	0	1	0	0	1	0
1	1	0	0	1	0	0
1	1	1	1	0	0	0

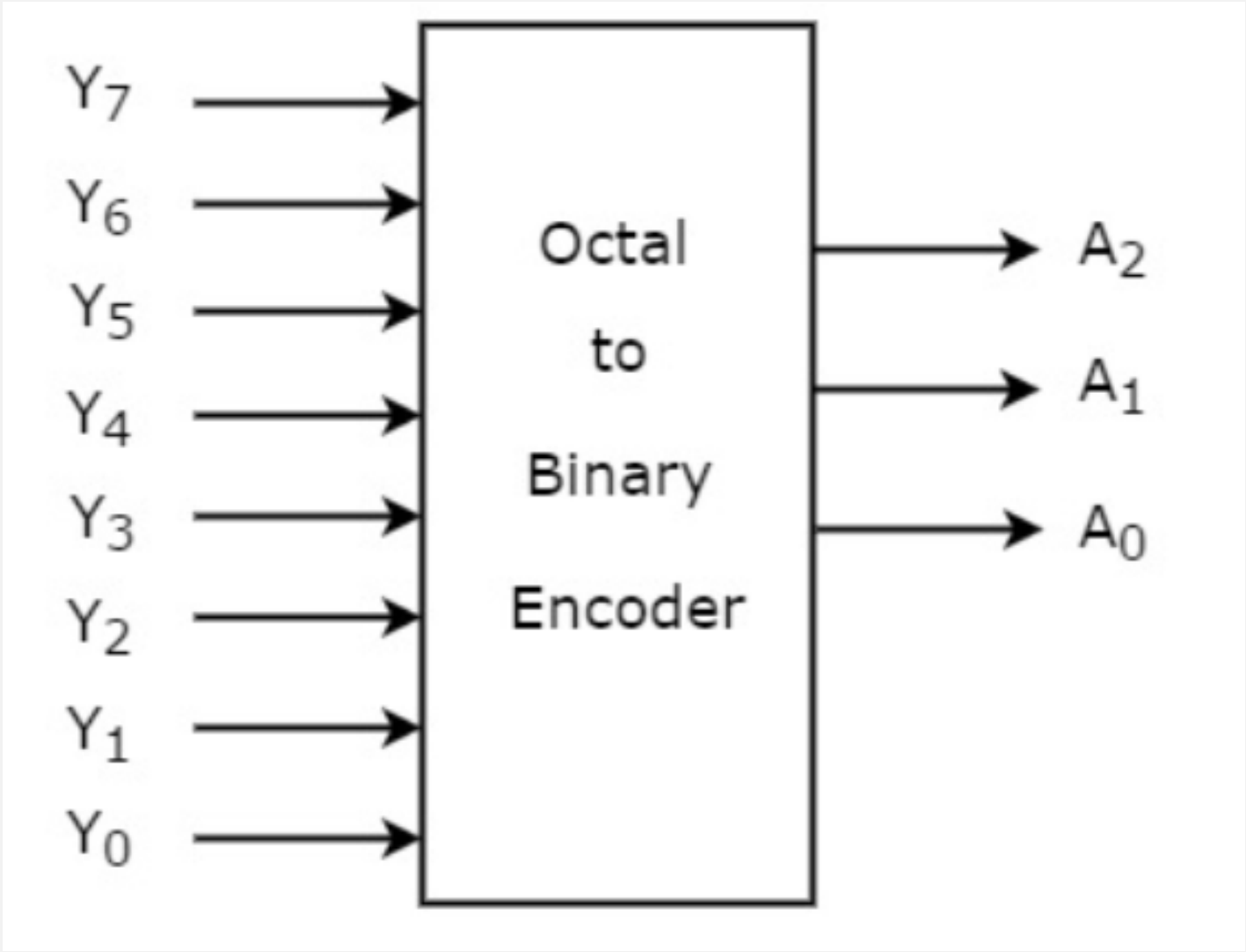


ENCODER

- An **Encoder** is a combinational circuit that performs the reverse operation of Decoder.
- It has maximum of 2^n input lines and 'n' output lines. It will produce a binary code equivalent to the input, which is active High. Therefore, the encoder encodes 2^n input lines with 'n' bits. It is optional to represent the enable signal in encoders.



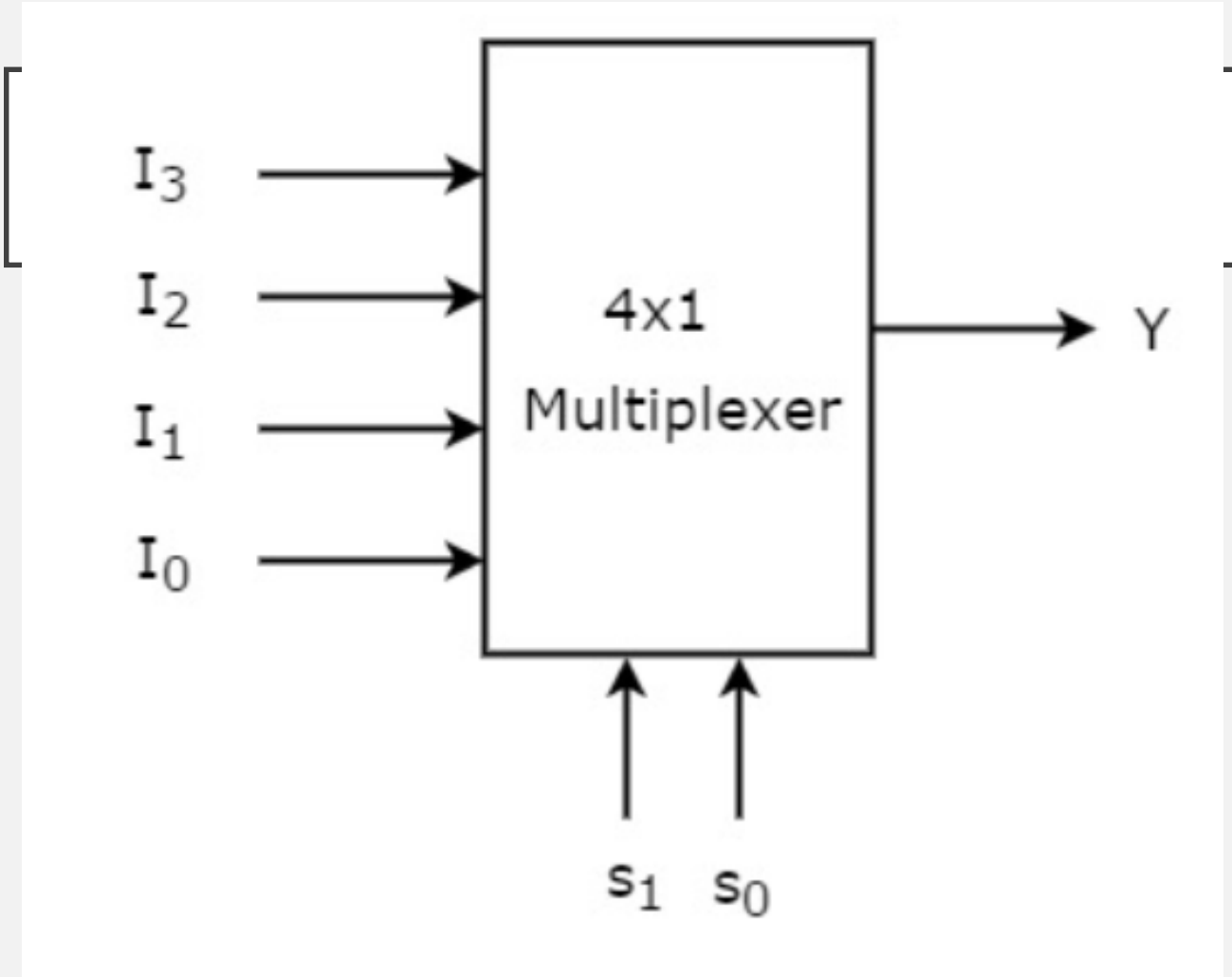
Inputs				Outputs	
Y_3	Y_2	Y_1	Y_0	A_1	A_0
0	0	0	1	0	0
0	0	1	0	0	1
0	1	0	0	1	0
1	0	0	0	1	1


Y7
Y6
Y5
Y4
Y3
Y2
Y1
Y0
Octal
to
Binary
Encoder
A2
A1
A0

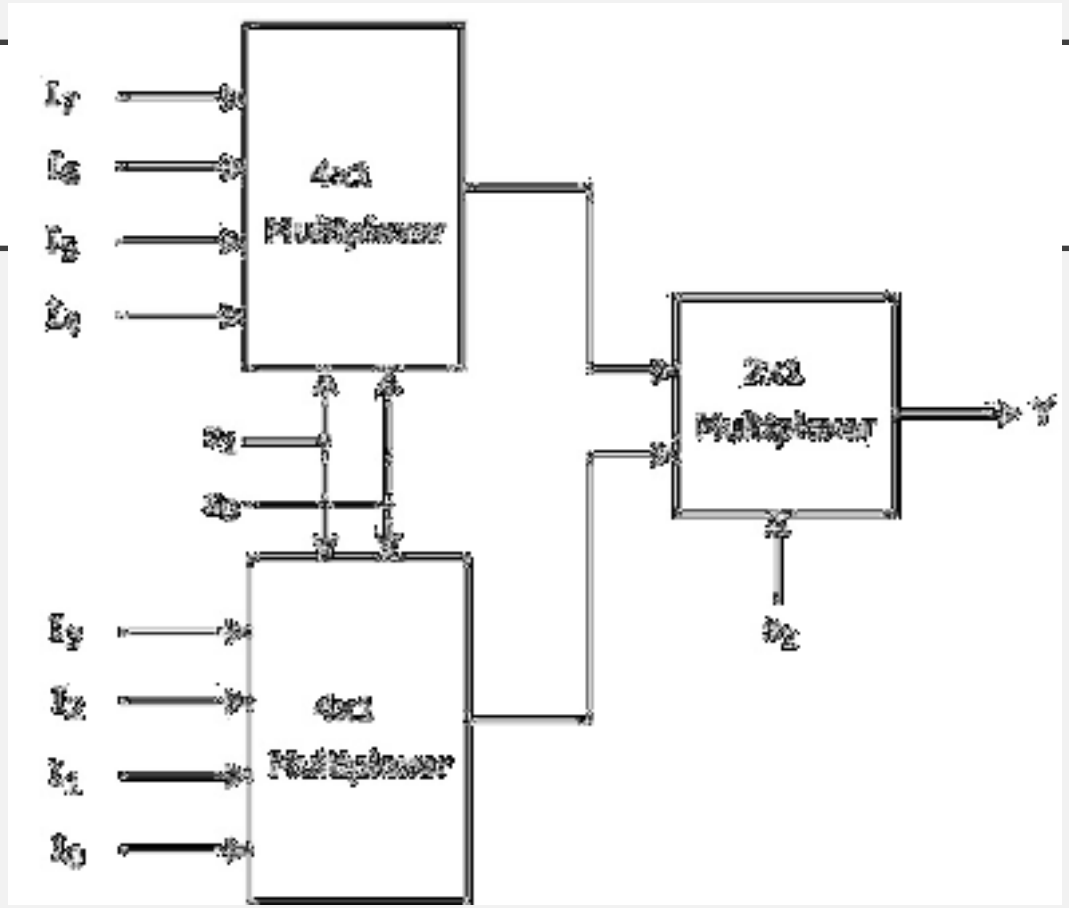
Inputs								Outputs		
Y_7	Y_6	Y_5	Y_4	Y_3	Y_2	Y_1	Y_0	A_2	A_1	A_0
0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0	0	1
0	0	0	0	0	1	0	0	0	1	0
0	0	0	0	1	0	0	0	0	1	1
0	0	0	1	0	0	0	0	1	0	0
0	0	1	0	0	0	0	0	1	0	1
0	1	0	0	0	0	0	0	1	1	0
1	0	0	0	0	0	0	0	1	1	1

MULTIPLEXER

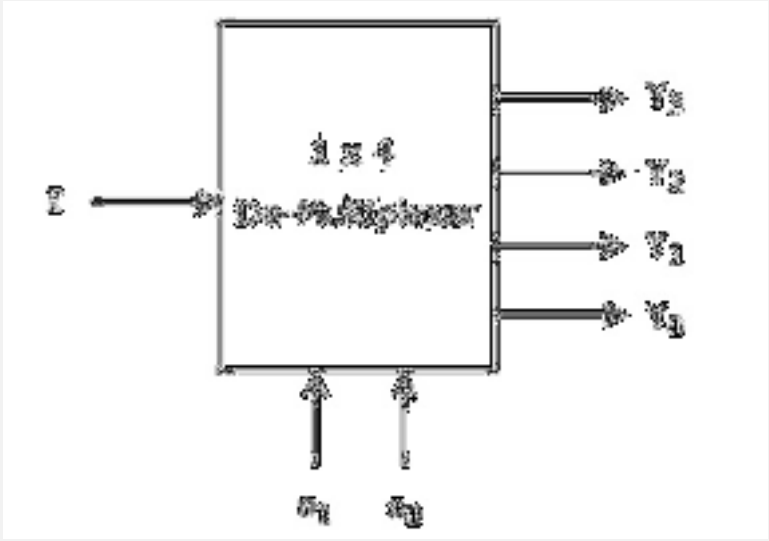
- **Multiplexer** is a combinational circuit that has maximum of 2^n data inputs, 'n' selection lines and single output line. One of these data inputs will be connected to the output based on the values of selection lines.
- Since there are 'n' selection lines, there will be 2^n possible combinations of zeros and ones. So, each combination will select only one data input. Multiplexer is also called as **Mux**.


I3
I2
I1
I0
4x1
Multiplexer
Y
s1
s0

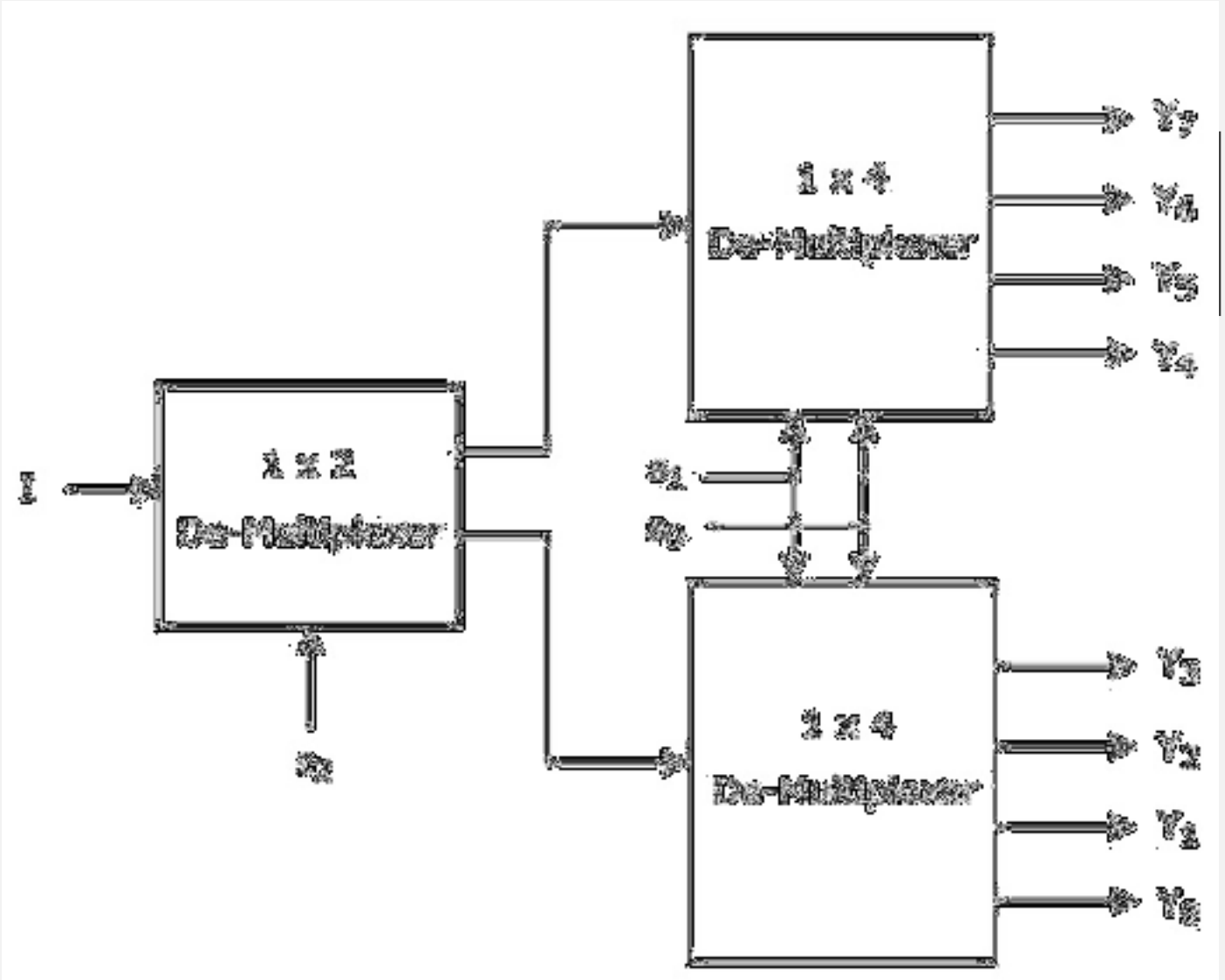
Selection Lines		Output
S_1	S_0	Y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3



- **De-Multiplexer** is a combinational circuit that performs the reverse operation of Multiplexer. It has single input, 'n' selection lines and maximum of 2^n outputs. The input will be connected to one of these outputs based on the values of selection lines.
- Since there are 'n' selection lines, there will be 2^n possible combinations of zeros and ones. So, each combination can select only one output. De-Multiplexer is also called as **De-Mux**.



Selection Inputs		Outputs			
S_1	S_0	Y_3	Y_2	Y_1	Y_0
0	0	0	0	0	I
0	1	0	0	I	0
1	0	0	I	0	0
1	1	I	0	0	0


1 x 4
1 x 4
1 x 4

REVIEW MATERI

- Pengenalan dasar sistem
- Sistem bilangan: 8,2,16, decimal, 2's complement,aritmatika
- Gerbang logika: and or not xor xnor
- Aljabar Boolean
- Standar form: minterm maxterm
- Kmap
- Desain logika kombinasional
- Adder , encoder decoder, mux demux

	I	I	0	0
	I	0	0	0
	I	0	0	0
	I	0	0	I