

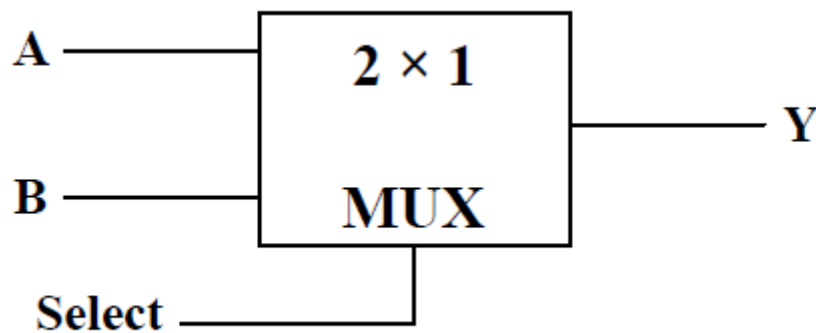
## Multiplexer and Demultiplexer

**Multiplexer:** is a combinational circuit that selects binary information from one of many input lines and directs it to a single output line.

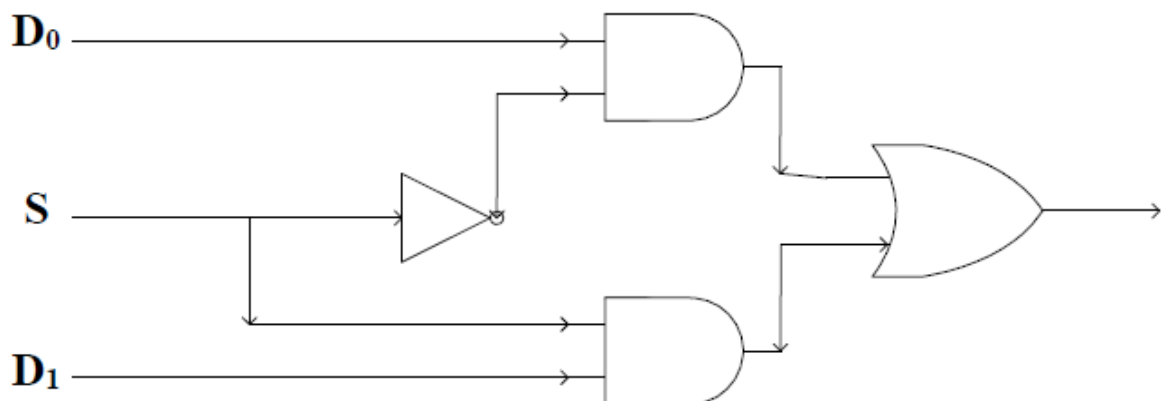
**Multiplexer:** is a circuit that accept many input but give only one output.

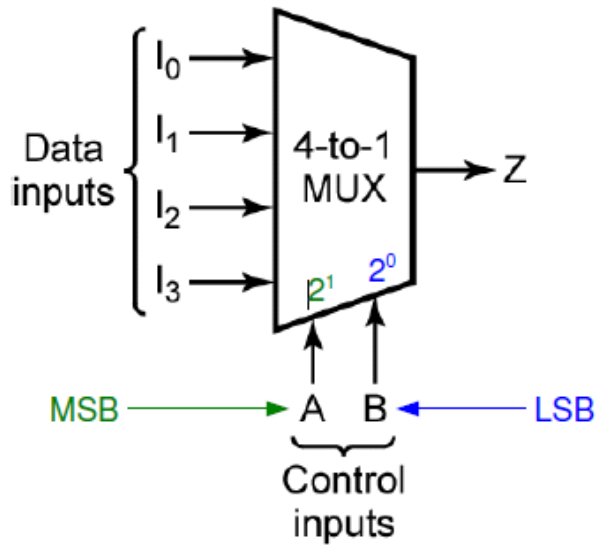
**Demultiplexer:** function exactly in the reverse of a multiplexer, that is a demultiplexer accepts only one input and gives many outputs.

**A multiplexer:** is a network that has many inputs and one output, and the value of the output will be the value of one of inputs which will be decided by some select lines. The simplest type of multiplexer is the two line to one line data multiplexer. Let A be one of the inputs and B is the other input and Y is the output and S is the select line, then



The logic circuit diagram of the Two to One line Multiplexer is shown





A	B	Z
0	0	$I_0$
0	1	$I_1$
1	0	$I_2$
1	1	$I_3$

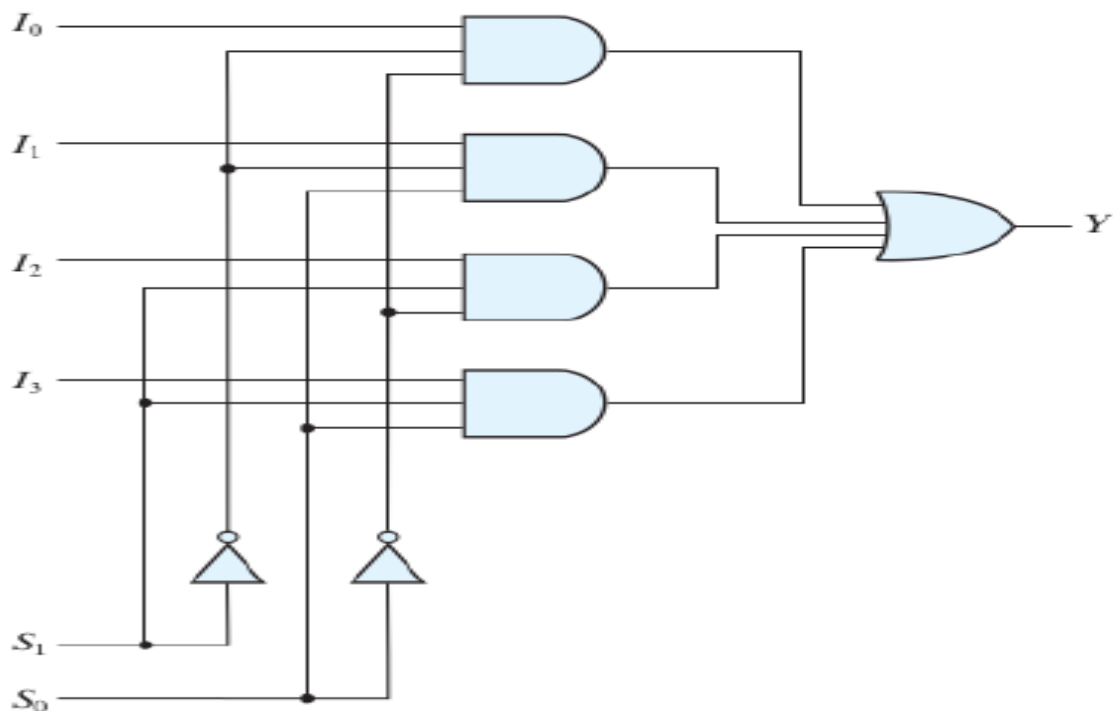
$$m_0 = A'.B'$$

$$m_1 = A'.B$$

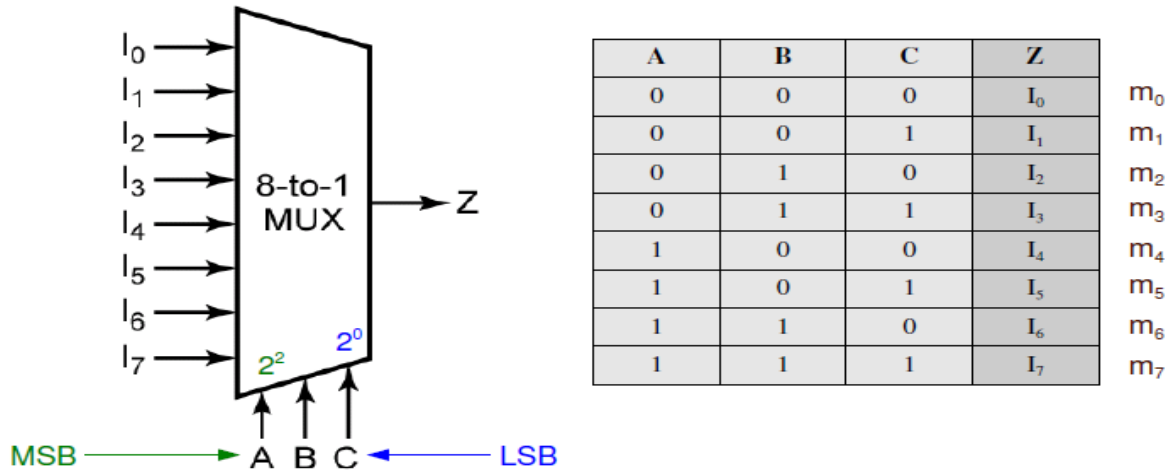
$$m_2 = A.B'$$

$$m_3 = A.B$$

$$Z = A'.B'.I_0 + A'.B.I_1 + A.B'.I_2 + A.B.I_3$$



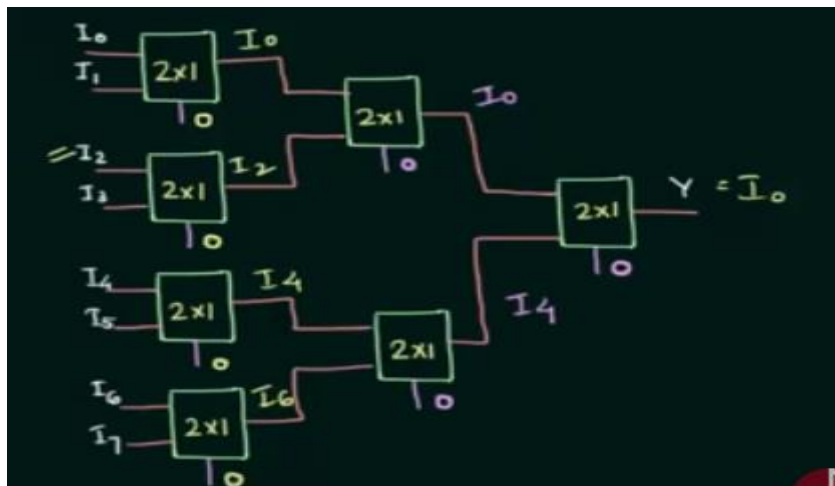
# Multiplexers



$$Z = A'.B'.C'.I_0 + A'.B'.C.I_1 + A'.B.C'.I_2 + A'.B.C.I_3 + A.B'.C'.I_4 + A.B'.C.I_5 + A.B.C'.I_6 + A.B.C.I_7$$

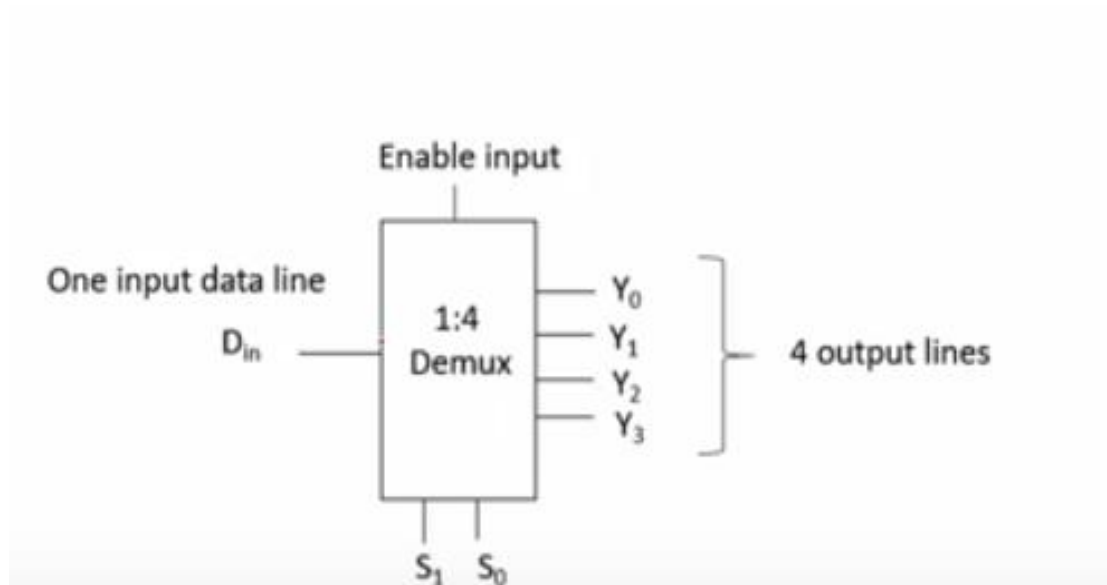
EX1 :Construct 8 × 1 MUX by using 2 × 1 MUX.

A	B	C	Z
0	0	0	I <sub>0</sub>
0	0	1	I <sub>1</sub>
0	1	0	I <sub>2</sub>
0	1	1	I <sub>3</sub>
1	0	0	I <sub>4</sub>
1	0	1	I <sub>5</sub>
1	1	0	I <sub>6</sub>
1	1	1	I <sub>7</sub>



**Demultiplexer:**

Demultiplexer means one to many. A demultiplexer is a circuit with one input and many output. By applying control signal, we can steer any input to the output. Few types of demultiplexer are 1-to-2, 1-to-4, 1-to-8 and 1-to-16 demultiplexer.

**Truth Table**

Inputs			Outputs			
E	$S_1$	$S_0$	$Y_3$	$Y_2$	$Y_1$	$Y_0$
0	X	X	0	0	0	0
1	0	0	0	0	0	$D_{in}$
1	0	1	0	0	$D_{in}$	0
1	1	0	0	$D_{in}$	0	0
1	1	1	$D_{in}$	0	0	0

