8×1 Mux truth table

Y	X_0	X_1	X_2	X_3	X_4	X_5	X_6	X_7	S_0	S_1	S_2
1	1	X	X	X	X	X	X	X	0	0	0
0	0	X	X	X	X	X	X	X	0	0	0
1	X	1	X	X	X	X	X	X	0	0	1
0	X	0	X	X	X	X	X	X	0	0	1
1	X	X	1	X	X	X	X	X	0	1	0
0	X	X	0	X	X	X	X	X	0	1	0
1	X	X	X	1	X	X	X	X	0	1	1
0	X	X	X	0	X	X	X	X	0	1	1
1	X	X	X	X	1	X	X	X	1	0	0
0	X	X	X	X	0	X	X	X	1	0	0
1	X	X	X	X	X	1	X	X	1	0	1
0	X	X	X	X	X	0	X	X	1	0	1
1	X	X	X	X	X	X	1	X	1	1	0
0	X	X	X	X	X	X	0	X	1	1	0
1	X	X	X	X	X	X	X	1	1	1	1
0	X	X	X	X	X	X	X	0	1	1	1

2x1 Mux KMAP

$X_1 X_0$ \\ S	0	1
00	0	0
01	0	0
10	1	0
11	1	1

$$Y = \bar{S} X_1 \bar{X_0} + \bar{S} X_1 X_0 + S X_1 X_0$$

$$Y = \bar{S} X_0 (\bar{X_1} + X_1) + S X_1 (X_0 + \bar{X_0})$$

$$Y = \bar{S} X_0 + S X_1$$

1X8 DEMUX truth table

X	S_2	S_1	S_0	Y_7	Y_6	Y_5	Y_4	Y_3	Y_2	Y_1	Y_0
1	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0	0	1	0
0	0	0	1	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	1	0	0
0	0	1	0	0	0	0	0	0	0	0	0
1	0	1	1	0	0	0	0	1	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	1	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0
1	1	0	1	0	0	1	0	0	0	0	0
0	1	0	1	0	0	0	0	0	0	0	0
1	1	1	0	0	1	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0	0	0
1	1	1	1	1	0	0	0	0	0	0	0
0	1	1	1	0	0	0	0	0	0	0	0

1×2 DEMUX KMAP

Y1

X \ S	0	1
0	0	0
1	0	1

Y0

X \ S	0	1
0	0	0
1	1	0

$$Y_1 = SX$$

$$Y_0 = \bar{S}X$$

3X8 DECODER truth table

~~Encoding~~

E	x2	x1	x0	y7	y6	y5	y4	y3	y2	y1	y0
0	X	X	X	0	0	0	0	0	0	0	0
1	1	1	1	1	0	0	0	0	0	0	0
1	1	1	0	0	1	0	0	0	0	0	0
1	1	0	1	0	0	1	0	0	0	0	0
1	1	0	0	0	0	0	1	0	0	0	0
1	0	1	1	0	0	0	0	1	0	0	0
1	0	1	0	0	0	0	0	0	1	0	0
1	0	0	1	0	0	0	0	0	0	1	0
1	0	0	0	0	0	0	0	0	0	0	1

1x2 Decoder KMAP

Y1

	e	0	1
x	0	0	1
0	X	0	0
1		0	1

Y0

	e	0	1
x	0	0	1
0	X	0	1
1	0	1	0

$Y_1 = ex$

$Y_0 = e\bar{x}$

e	X_7	X_6	X_5	X_4	X_3	X_2	X_1	X_0	Y_2	Y_1	Y_0
0	X	X	X	X	X	X	X	X	0	0	0
1	1	X	X	X	X	X	X	X	1	1	1
1	0	1	X	X	X	X	X	X	1	1	0
1	0	0	1	X	X	X	X	X	1	0	1
1	0	0	0	1	X	X	X	X	1	0	0
1	0	0	0	0	1	X	X	X	0	1	1
1	0	0	0	0	0	1	X	X	0	1	0
1	0	0	0	0	0	0	1	X	0	0	1
1	0	0	0	0	0	0	0	1	0	0	0

2X1 PRIORITY ENCODER truth table

$x_1 x_0$	e	y
0 0	0	0
0 1	0	0
1 0	0	1
1 1	0	1

$$Y = X_1 X_0 + X_1 \bar{X_0}$$

$$Y = X_1$$