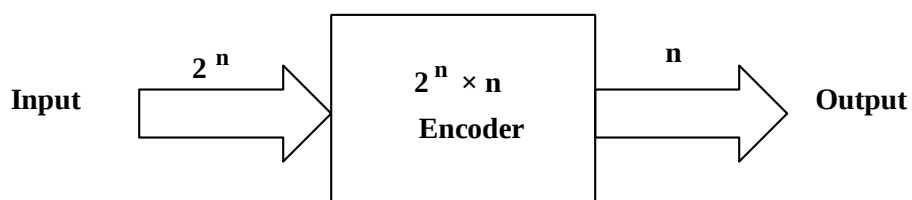
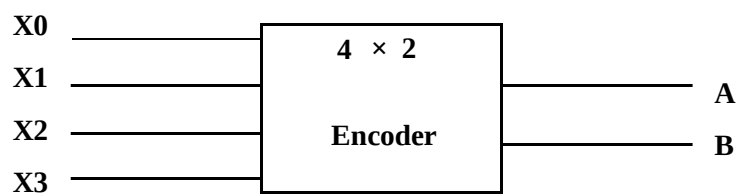


2. Encoder

An encoder is a combinational logic circuit that generate n output lines from 2^n (or less) inputs. It has the reverse function of the decoder.

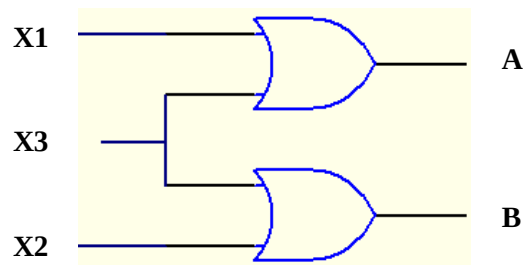


EX1: Design four to two line encoder and prepare a truth table.



INPUTS					OUTPUTS	
	X_3	X_2	X_1	X_0	B	A
	0	0	0	1	0	0
	0	0	1	0	0	1
	0	1	0	0	1	0
	1	0	0	0	1	1

Truth Table of Four to Two Line Encoder



	$\bar{X}_1\bar{X}_0$	$\bar{X}_1X_0$	X_1X_0	$X_1\bar{X}_0$
$\bar{X}_3\bar{X}_2$	X	0	X	1
$\bar{X}_3X_2$	0	X	X	X
$X_3\bar{X}_2$	X	X	X	X
X_3X_2	1	X	X	X

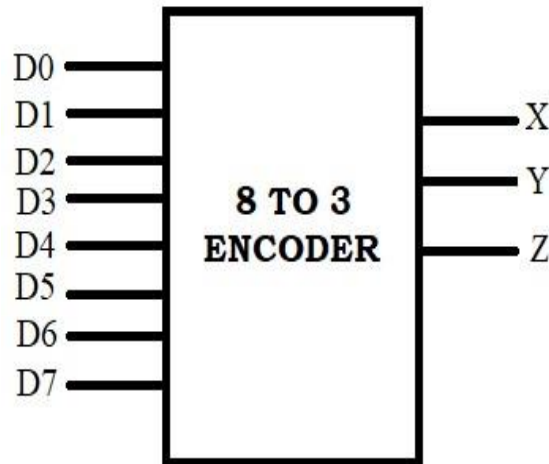
$$A = X_1 + X_3$$

	$\bar{X}_1\bar{X}_0$	$\bar{X}_1X_0$	X_1X_0	$X_1\bar{X}_0$
$\bar{X}_3\bar{X}_2$	X	0	X	0
$\bar{X}_3X_2$	1	X	X	X
$X_3\bar{X}_2$	X	X	X	X
X_3X_2	1	X	X	X

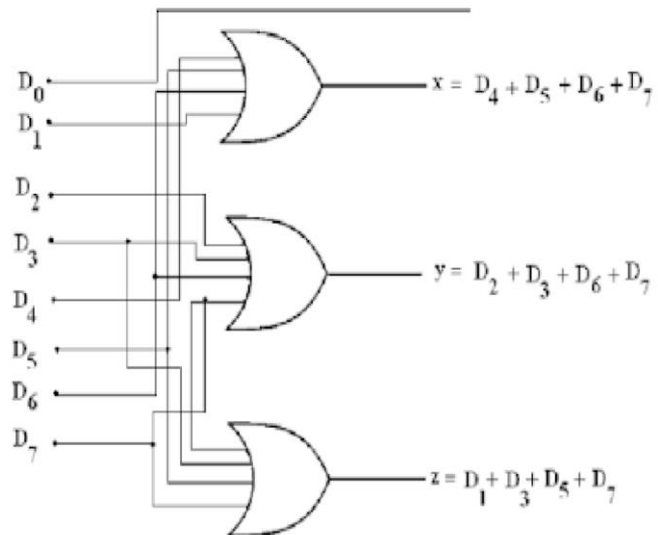
$$B = X_2 + X_3$$

EX2: Design 8-3 line encoder and prepare a truth table.

8-3 Encoder Block diagram



8-3 Encoder logic Diagram:



Digital Inputs								Binary Output		
D7	D6	D5	D4	D3	D2	D1	D0	X	Y	Z
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

Truth Table of 8-3 encoder

Note: we need to use 8-variable Karnaugh Map its difficult.

Then we can find X, Y, and Z:

$$X = D4 + D5 + D6 + D7$$

$$Y = D2 + D3 + D6 + D7$$

$$Z = D1 + D3 + D5 + D7$$

