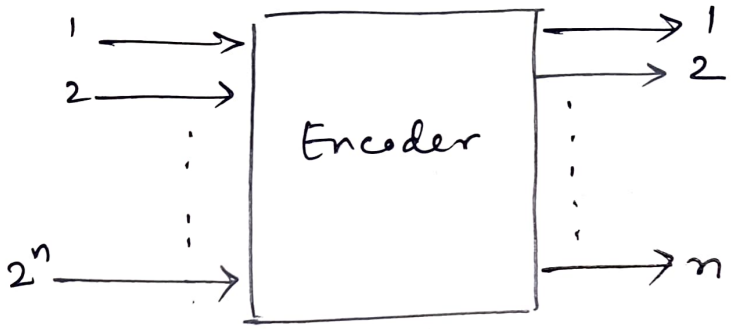
ENCODER

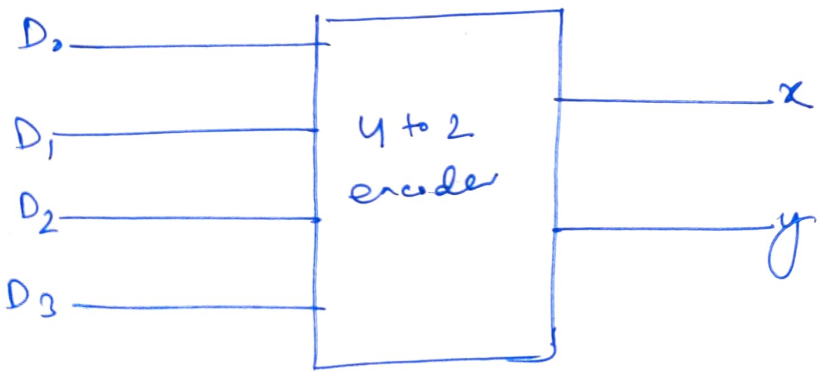
- It is a combinational circuit that has 2^n no. of lines of inputs and n no. of outputs.



- The o/p line generates the binary codes corresponds to each input value.

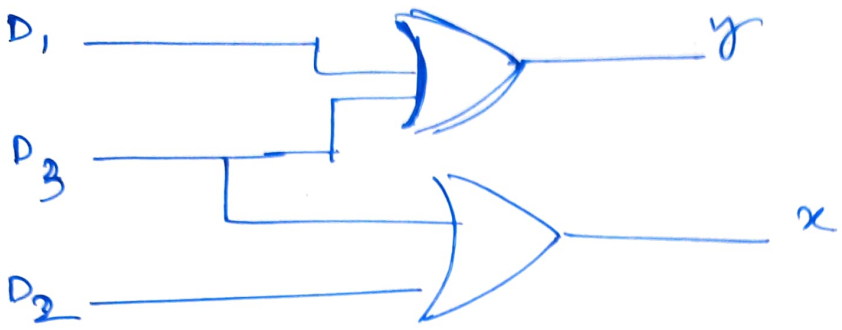
* 4 to 2 line encoder:

D_0	D_1	D_2	D_3	x	y
1	0	0	0	0	0
0	1	0	0	0	1
0	0	1	0	1	0
0	0	0	1	1	1



$x = D_2 + D_3$

$y = D_1 + D_3$



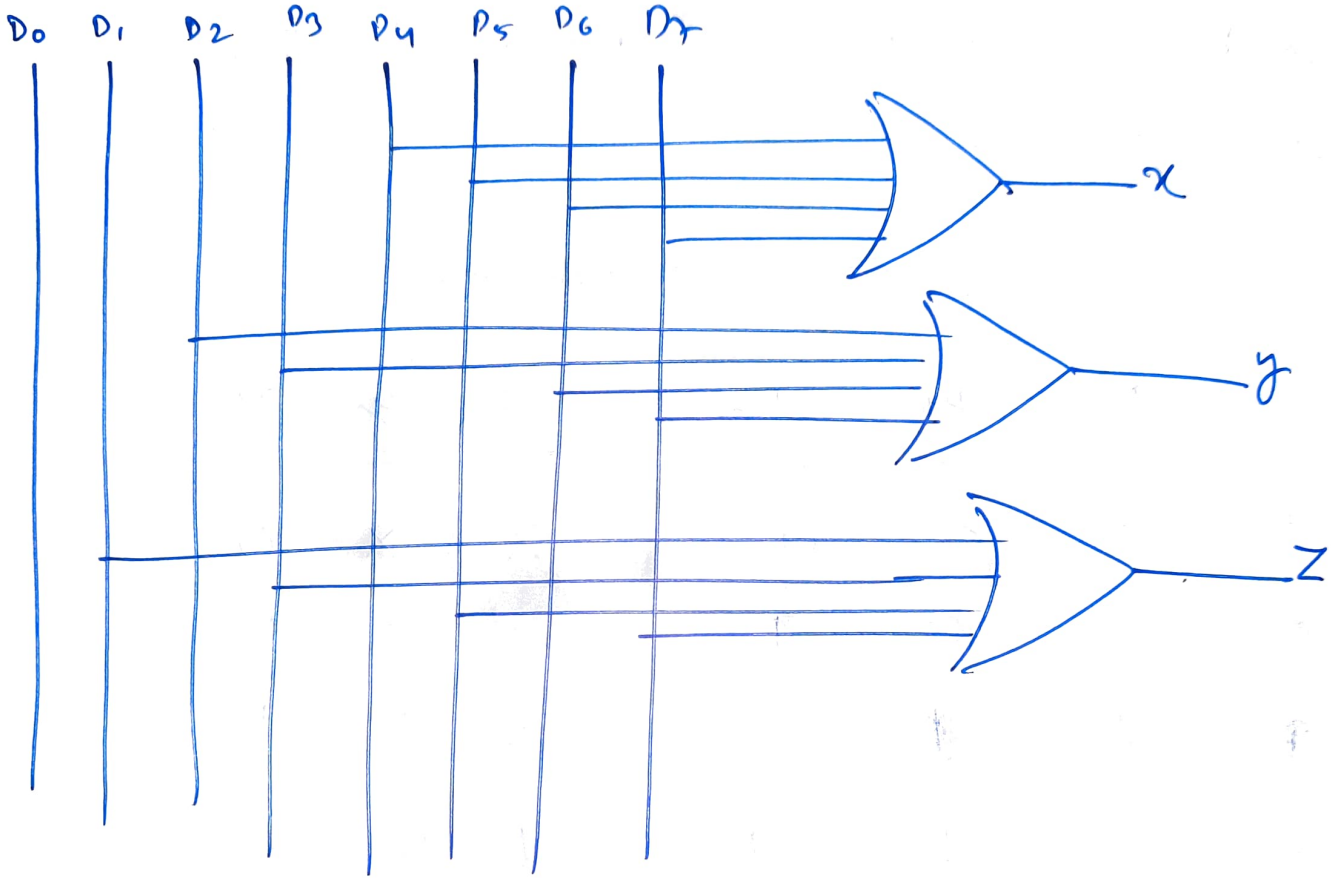
8*3 Encoder :

D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	x	y	z
1	0	0	0	0	0	0	0	0	0	0
0	1	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	1	1
0	0	0	0	1	0	0	0	1	0	0
0	0	0	0	0	1	0	0	1	0	1
0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	1	1	1	1

$$x = D_4 + D_5 + D_6 + D_7$$

$$y = D_2 + D_3 + D_6 + D_7$$

$$z = D_1 + D_3 + D_5 + D_7$$



Disadvantages:

i) Only one input can be active at a time.

ii) If more than more inputs got active, we will get undefined combination.

iii) To resolve this, we will use priority to ensure only one input is encoded.

PRIORITY ENCODER :

It is a combinational that includes priority function, if two or more inputs are equal to 1 at the same time., then the input having highest priority will be considered.

ex. 4 to 2 priority encoder.

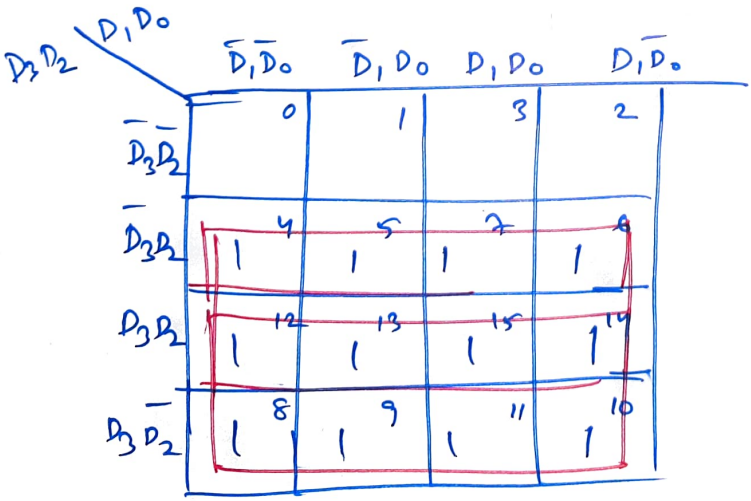
D_3	D_2	D_1	D_0	x	y	V
0	0	0	0	X	X	0
0	0	0	1	0	0	1
0	0	1	0	0	1	1
0	0	1	1	1	0	1
0	1	0	0	1	0	1
0	1	0	1	1	0	1
0	1	1	0	1	0	1
0	1	1	1	1	0	1
1	0	0	0	1	0	1
1	0	0	1	1	1	1
1	0	1	0	1	1	1
1	0	1	1	1	1	1
1	1	0	0	1	1	1

1	1	0	1	1	1	1
1	1	1	0	1	1	1
1	1	1	1	1	1	1

⇓ summary type.

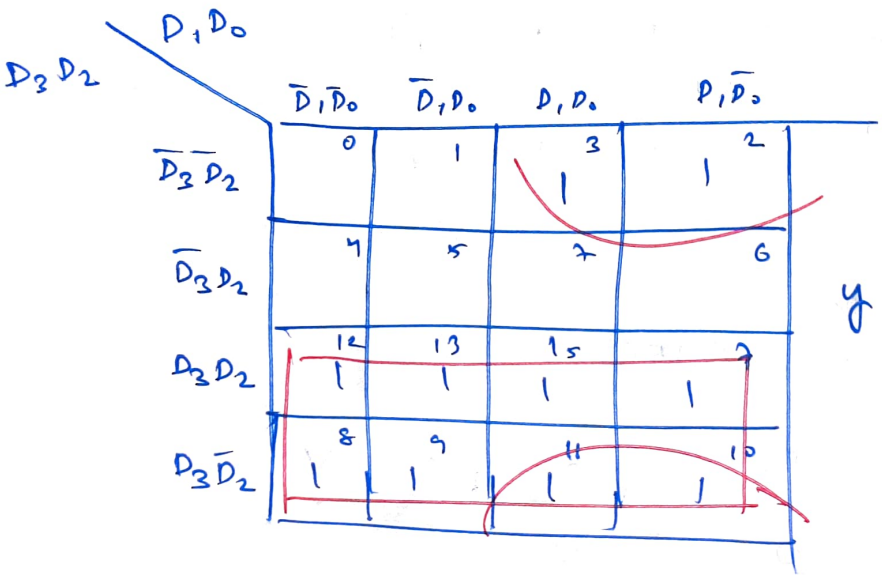
D_0	D_1	D_2	D_3	x	y	V
0	0	0	0	X	X	0
1	0	0	0	0	0	1
X	1	0	0	0	1	1
X	X	1	0	1	0	1
X	X	X	1	1	1	1

$x = \sum m(4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)$



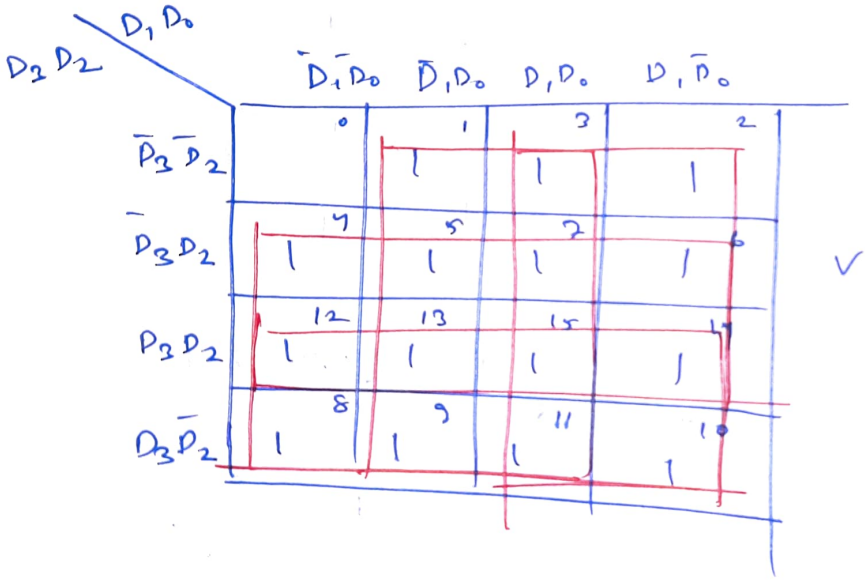
$x = D_2 + D_3$

$$y = \sum m(2,3,8,9,10,11,12,13,14,15)$$



$$y = D_3 + \bar{D}_2 D_1$$

$$v = \sum m(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15)$$



$$v = D_1 + D_2 + D_3 + D_0$$

Circuit diagram: