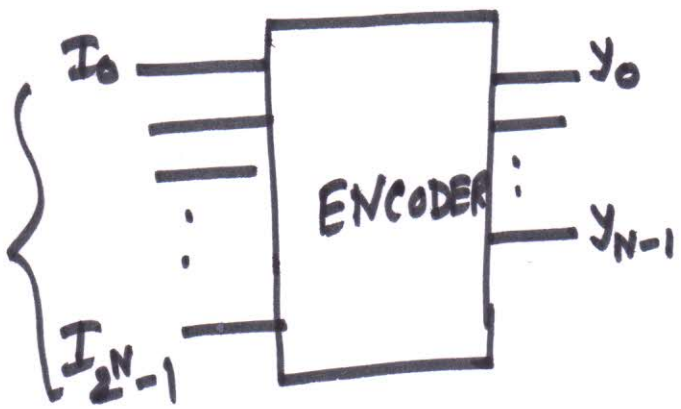
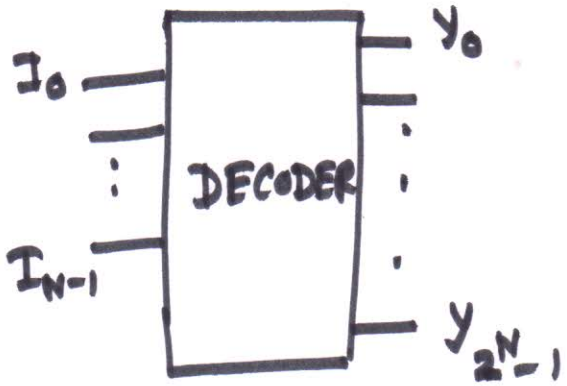
Encoder and Decoder





no. of I/p = 2^N (>N)

no. of O/p = N

Ex :

1) BCD to Binary Encoder
(10 x 4 Encoder)

2) Octal to Binary Encoder

no. of I/p = N

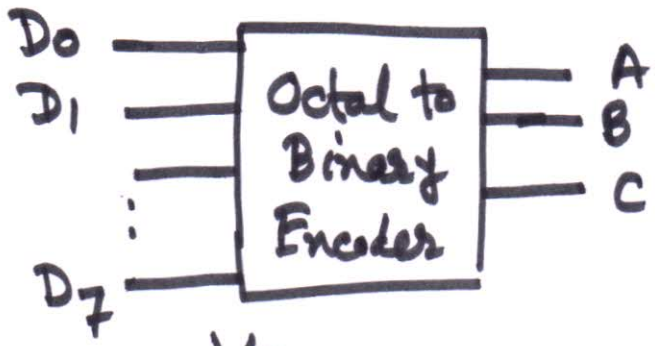
no. of O/p = 2^N (>N)

Ex.

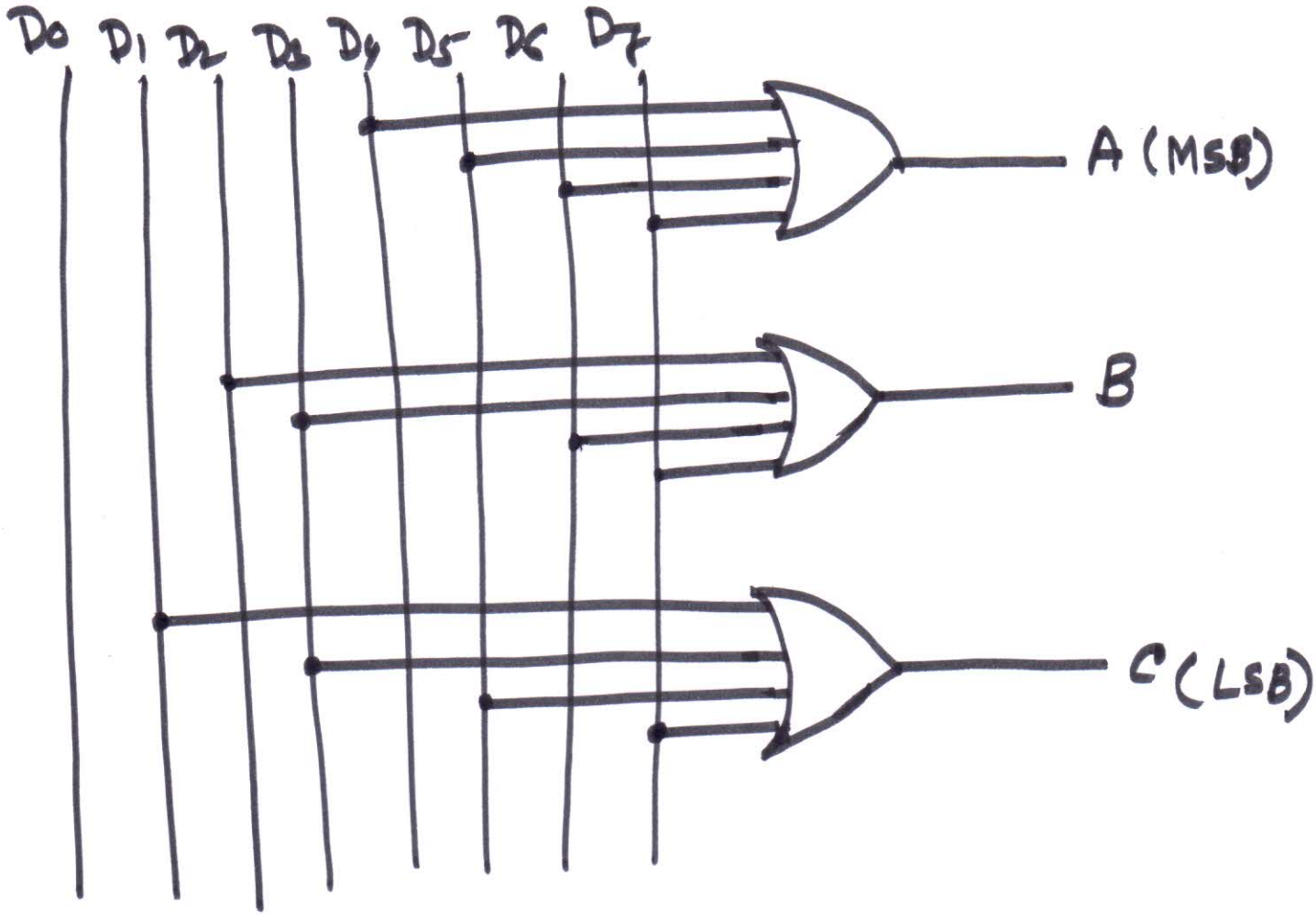
1) 4 to 16 line decoder

2) 7 Segment Decoder

Octal to binary encoder:



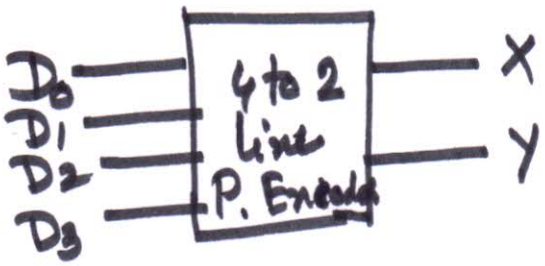
I/p								O/p		
D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	A	B	C
1	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	1	0
0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	1	0	0	0	1	0	0
0	0	0	0	0	1	0	0	1	0	1
0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	1	1	1	1


D0
D1
D2
D3
D4
D5
D6
D7
A (MSB)
B
C (LSB)

Priority Encoder:

In this type of encoder, a priority is assigned to each input so that, when more than one input is simultaneously active, the input with highest priority is encoded.

Ex. 4-to-2 line priority encoder

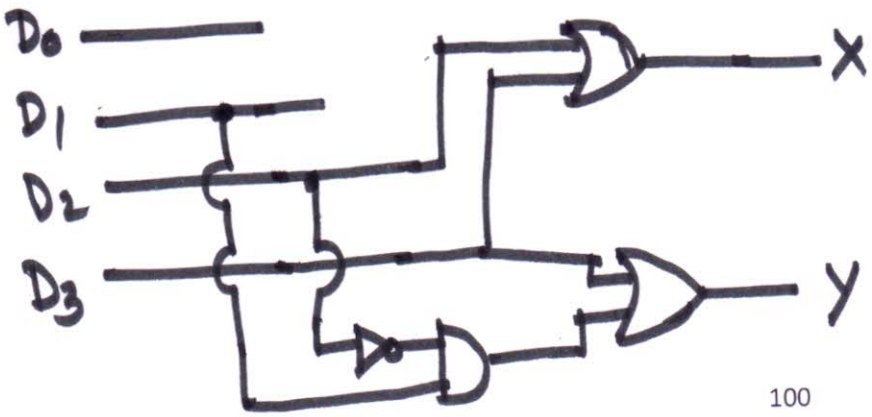


II

I/P				O/P	
D_0	D_1	D_2	D_3	X	Y
1	0	0	0	0	0
X	1	0	0	0	1
X	X	1	0	1	0
X	X	X	1	1	1

$$X = D_3 + D_2\overline{D_3}$$
$$= (D_3 + D_2)(D_3 + \overline{D_3})$$
$$= D_3 + D_2$$

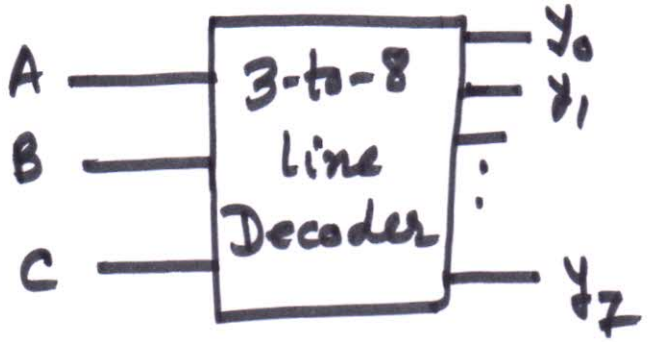
$$Y = D_3 + D_1\overline{D_2}\,\overline{D_3}$$
$$= (D_3 + D_1\overline{D_2})(D_3 + \overline{D_3})$$
$$= D_3 + D_1\overline{D_2}$$



Ex. 10-line decimal to BCD priority encoder (inputs and outputs are active when LOW)

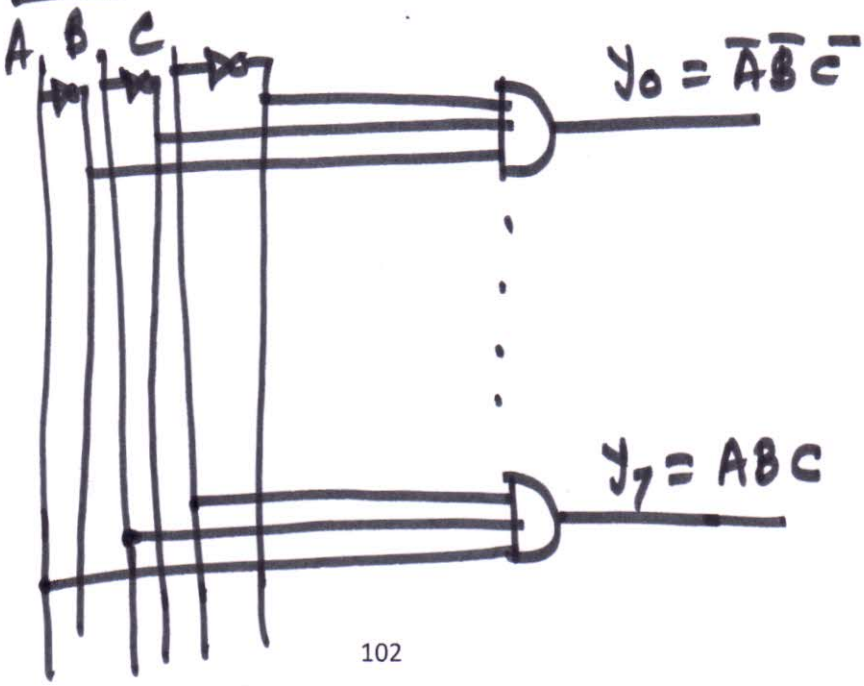
10-line decimal inputs										BCD Outputs			
0	1	2	3	4	5	6	7	8	9	D	C	B	A
0	1	1	1	1	1	1	1	1	1	1	1	1	1
X	0	1	1	1	1	1	1	1	1	1	1	1	0
X	X	0	1	1	1	1	1	1	1	1	1	0	1
			0										
				0									
					0				1				
		X				0							
							0						
								0					
									0	0	1	1	0

3-to-8 line decoder:



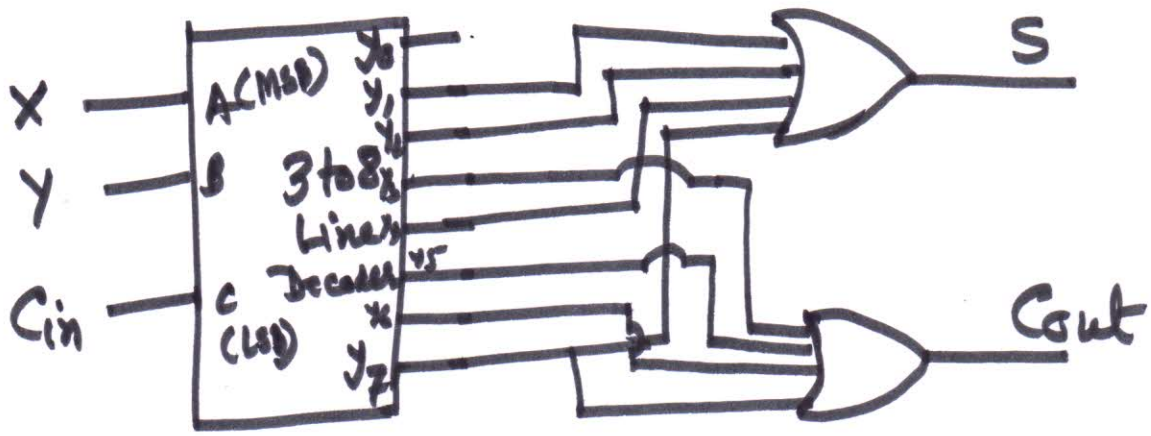
TT

i/p			o/p							
A	B	C	y_0	y_1	y_2	y_3	y_4	y_5	y_6	y_7
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
.	.	.	.							.
.	.	.	.							.
1	1	1	0	0	0	0	0	0	0	1

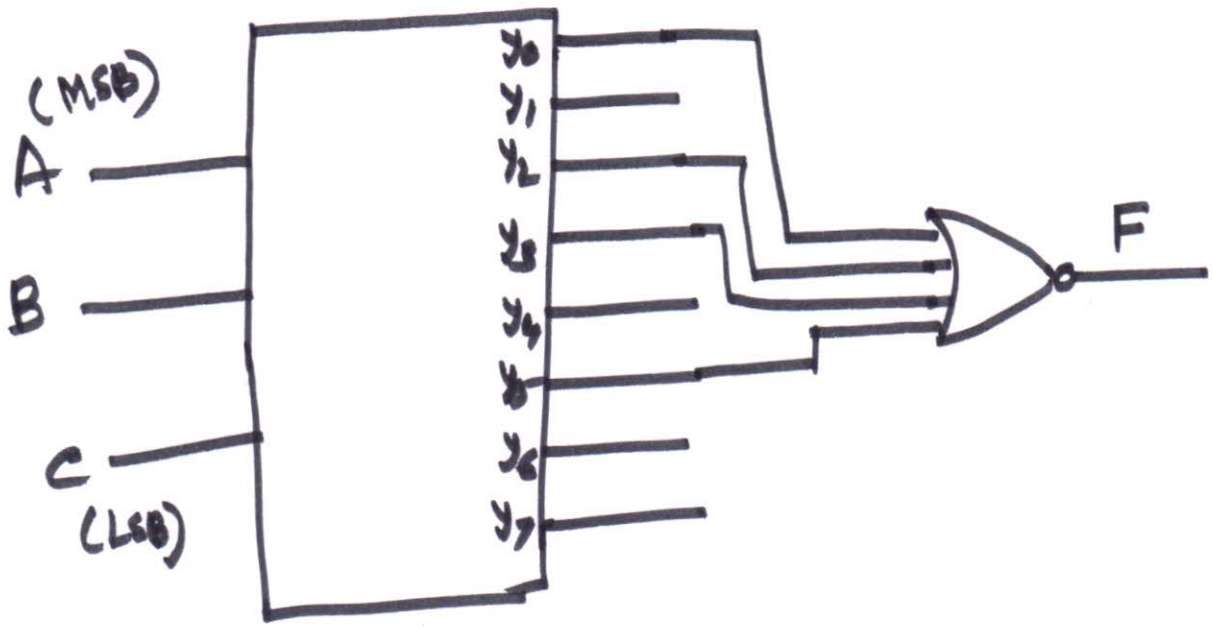


Implement a full adder circuit using 3-to-8 line decoder:

Decimal no	X	Y	Cin	S	Cout
0	0	0	0	0	0
1	0	0	1	1	0
2	0	1	0	1	0
3	0	1	1	0	1
4	1	0	0	1	0
5	1	0	1	0	1
6	1	1	0	0	1
7	1	1	1	1	1



Implement $F(A, B, C) = \sum m(1, 4, 6, 7)$ using 3-to-8 line decoder and an external NOR gate.



$$F(A,B,C) = \sum m(1,4,6,7)$$

$$= \prod(0,2,3,5)$$