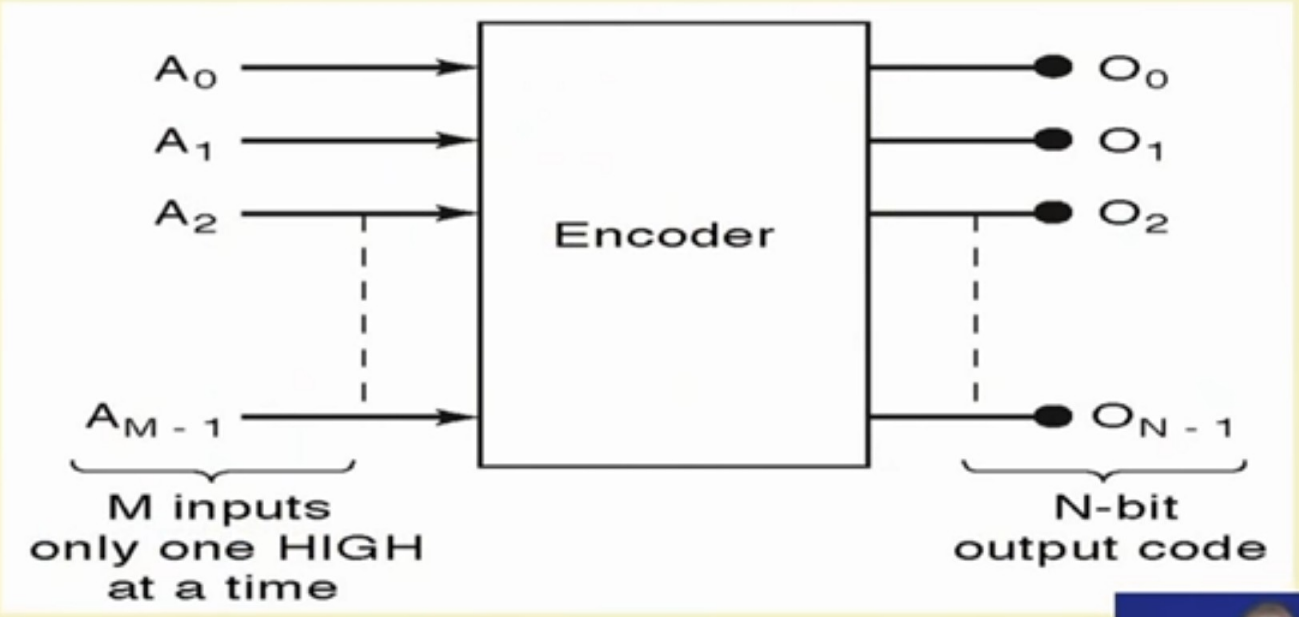
Encoder

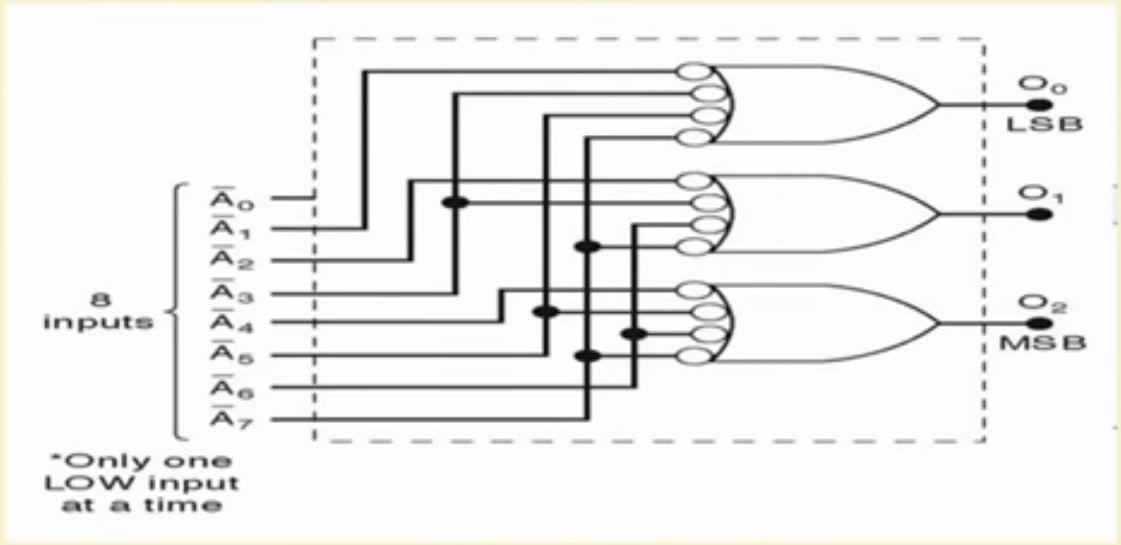
- An encoder is a combinational logic circuit that essentially performs a "reverse" of decoder functions.
- An encoder accepts an active level on one of its inputs, representing digit, such as a decimal or octal digits, and converts it to a coded output such as BCD or binary.
- Encoders can also be devised to encode various symbols and alphabetic characters.
- The process of converting from familiar symbols or numbers to a coded format is called ***encoding***.

- Most decoders accept an input code and produce a HIGH (or a LOW) at one and only one output line.
- In otherworlds , a decoder identifies, recognizes, or detects a particular code. The opposite of this decoding process is called encoding and is performed by a logic circuit called an encoder.
- An encoder has a number of input lines, only one of which input is activated at a given time and produces an N-bit output code,depending on which input is activated.

General encoder diagram



Logic circuit for octal-to binary encoder [8-line- 3-line]



Truth table for octal-to binary encoder [8-line- 3-line]

Inputs								Outputs		
$\bar{A}_0$	$\bar{A}_1$	$\bar{A}_2$	$\bar{A}_3$	$\bar{A}_4$	$\bar{A}_5$	$\bar{A}_6$	$\bar{A}_7$	O_2	O_1	O_0
X	1	1	1	1	1	1	1	0	0	0
X	0	1	1	1	1	1	1	0	0	1
X	1	0	1	1	1	1	1	0	1	0
X	1	1	0	1	1	1	1	0	1	1
X	1	1	1	0	1	1	1	1	0	0
X	1	1	1	1	0	1	1	1	0	1
X	1	1	1	1	1	0	1	1	1	0
X	1	1	1	1	1	1	0	1	1	1

A low at any single input will produce the output binary code corresponding to that input. For instance , a low at A_3' will produce O_2 =0, O_1=1 and O_0 =1, which is binary code for 3. A_0' is not connected to the logic gates because the encoder outputs always be normally at 000 when none of the inputs is LOW

Design of 4-input Priority Encoder
(4-line-to 2 line priority encoder) (1)...

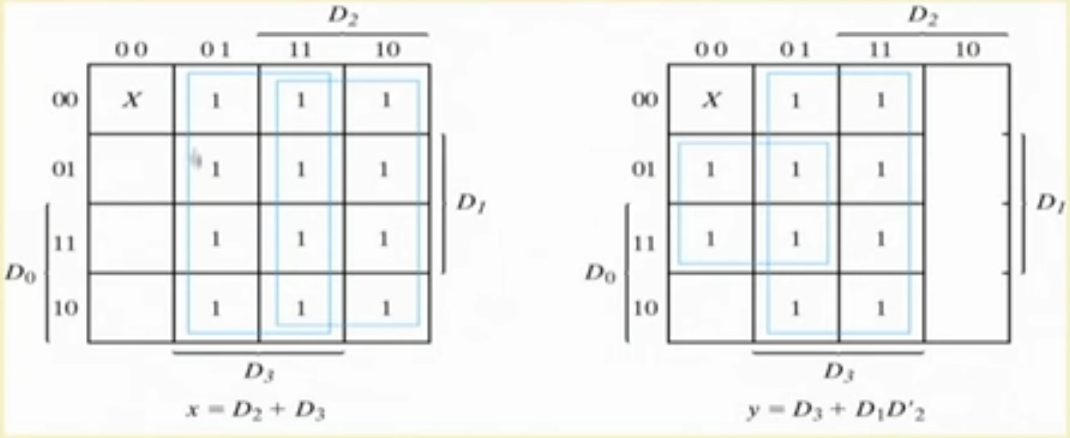
- A priority encoder is an encoder that includes the priority function
- If two or more inputs are equal to 1 at the same time, the input having the highest priority will take precedence.
- **Truth Table of a 4-input Priority Encoder:**

Inputs				Outputs		
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

Design of 4-input Priority Encoder
(4-line-to 2 line priority encoder) (2)...

- In addition to two outputs x, and y, the truth table has a third output designated by V, which is a valid bit indicator that is set 1 when one or more inputs are equal to 1. If all inputs are 0, there is no valid input and V is equal to 0.
- X's in the output column indicate don't care conditions, the X's in the input columns are useful for representing a truth table in condensed form.
- The higher the subscript number, the higher the priority of the input. Input D3 has the highest priority, so regardless of the values of the other inputs, when this input is 1, the output for xy is 11 (binary 3)

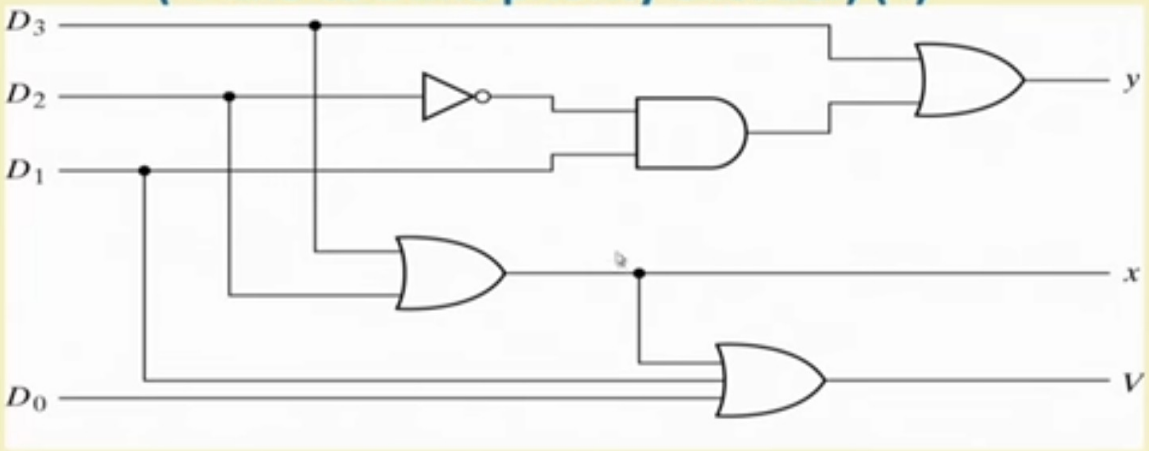
Design of 4-input Priority Encoder
(4-line-to 2 line priority encoder) (3)...



$V=D_0+D_1+D_2+D_3$

K-Maps for 4-input Priority Encoder

Design of 4-input Priority Encoder
(4-line-to 2 line priority encoder) (4)



Logic Diagram for 4-input priority encoder