Priority Encoder:

- A priority encoder is an encoder circuit that includes the priority function. In priority encoder, if two or more inputs are equal to 1 at the same time, the input having the highest priority will take precedence.
- Table shows Dg input with highest priority and DQ input with lowest priority. When D3 input is high, regardless of other inputs output is 11. The D2 has the next priority. Thus, when D3 = 0 and D2 = 1, regardless of other two lower priority input, output is 10. The output for D1 is generated only if higher priority inputs are 0, and so on. The output V (a valid output indicator) indicates, one or more of the inputs are equal to 1. If all inputs are 0, V is equal to 0, and the other two outputs (Yj and YQ) of the circuit are not used.

Truth table of 4-bit priority :

Inputs				Outputs		
D_0	D_1	D_2	D_3	Y_1	Y_0	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

K-MAP SIMPLIFICATION :

For Y_1

D_0D_1 \ D_2D_3	00	01	11	10
00	X	1	1	1
01	0	1	1	1
11	0	1	1	1
10	0	1	1	1

$Y_1 = D_2 + D_3$

For Y_0

D_0D_1 \ D_2D_3	00	01	11	10
00	X	1	1	0
01	1	1	1	0
11	1	1	1	0
10	0	1	1	0

$Y_0 = D_3 + D_1\overline{D}_2$

For V

D_0D_1 \ D_2D_3	00	01	11	10
00	0	1	1	1
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

$V = D_0 + D_1 + D_2 + D_3$

LOGIC DIAGRAM :