8. Implement half adder using 2-4 decoder.

ans:- Solution:

Truth table of half adder:

Input		Output	
x	y	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Truth table of decoder:

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

Comparing the above truth tables, we get,

$$Sum = D_1 + D_2$$
$$Carry = D_3$$

Block diagram of Half adder using 2-4 decoder:

x ─────── | 2×4 | D_0
decoder | D_1 | ─── Sum
| D_2
y ─────── | D_3 | $Carry$

↑
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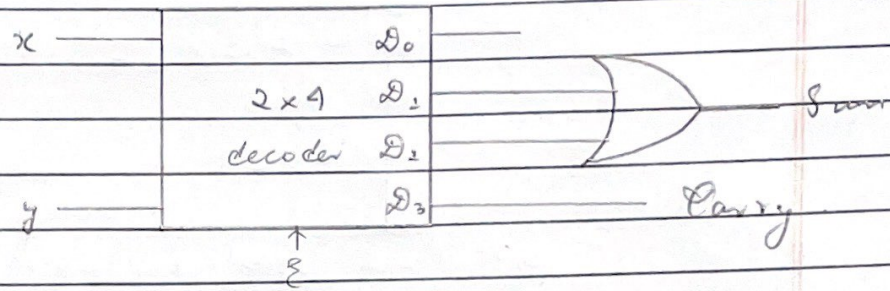
Note:

By connecting an OR gate with output Pin 1 and 2 of 2×4 decoder, half adder can be implemented.

Similarly, by connecting two half adders, we can form a Full Adder by using two, 2×4 Decoder IC's.