

DE Assignment :-

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Elevator Simulation :-

Sequential Design

An elevator has 4 floors, and can be called to any floor, but must proceed through intermediate floors before reaching the destination.

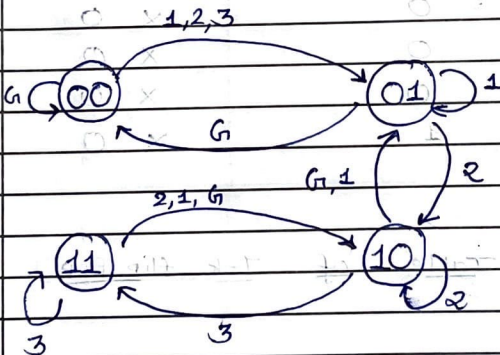
States

inputs

G 1 2 3
 00 01 10 11

G 1 2 3
 00 01 10 11

State Diagram



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(Present) States	Floors	(Earliest Next state) States	Flip-flop Inputs
$Q_1 Q_0$	$F_1 F_0$	$Q_1^* Q_0^*$	$J_1 K_1 J_0 K_0$
0 0	0 0	0 0	0 x 0 x
0 0	0 1	0 1	0 x 1 x
0 0	1 0	0 1	0 x 1 x
0 0	1 1	0 1	0 x 1 x
0 1	0 0	0 0	0 x x 1
0 1	0 1	0 1	0 x x 0
0 1	1 0	1 0	1 x x 1
0 1	1 1	1 0	1 x x 1
1 0	0 0	0 1	x 1 1 x
1 0	0 1	0 1	x 1 1 x
1 0	1 0	1 0	x 0 0 x
1 0	1 1	1 1	x 0 1 x
1 1	0 0	1 0	x 1 0 x
1 1	0 1	1 0	x 1 0 x
1 1	1 0	1 1	x 0 1 x
1 1	1 1	1 1	x 0 1 x

As Per Excitation

Table of J-k flip-flop

Q	Q^*	J	K
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

$Q_0 \backslash F_0$	00	01	10	11
00	0	0	0	0
01	0	0	1	1
10	x	x	x	x
11	x	x	x	x

$$J_1 = Q_0 F_1$$

$Q_0 \backslash F_0$	00	01	10	11
00	x	x	x	x
01	x	x	x	x
10	0	0	0	0
11	1	1	0	0

$$K_1 = Q_0' F_1'$$

$Q_0 \backslash F_0$	00	01	10	11
00	0	1	1	1
01	x	x	x	x
10	x	x	x	x
11	1	1	1	0

$$J_0 = F_0 + Q_1 F_1' + Q_1' F_1$$

$$= \underline{F_0 + Q_1 \oplus F_1}$$

$Q_0 \backslash F_0$	00	01	10	11
00	x	x	x	x
01	1	0	1	1
10	1	1	0	1
11	x	x	x	x

$$K_0 = F_0' + Q_1 F_1' + Q_1' F_1$$

$$= \underline{F_0' + Q_1 \oplus F_1}$$

* Components Included:-

1) Priority Encoder

2) Basic Logic Gates i.e. AND, OR, XOR, etc.

3) J-k Flip Flop, D Flip Flop

4) 7-segment Display

5) Multiplexer

6) De-Multiplexer

Random Sequence Counter (0-4-1-2-3-5-0):

Present state			Next state			Flip Flop		
A(t)	B(t)	C(t)	A(t+1)	B(t+1)	C(t+1)	D _A	D _B	D _C
0	0	0	1	0	0	1	0	0
1	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	0
0	1	0	0	1	1	0	1	1
0	1	1	1	0	1	1	0	1
1	0	1	0	0	0	0	0	0

Equations:

$$D_A = A'(B \odot C)$$

$$D_B = A'(B \oplus C)$$

$$D_C = AB'C' + A'B$$