

Solutions

Class Exercise—From State Tables to Minimal Sums

12/2/15

The state table shown below is for a clocked synchronous sequential network. Assigning codes in binary order to the states, determine minimal sum excitation and output expressions for the sequential network assuming the use of JK flip-flops.

Table P7.19

Present state	Next state		Output (z)	
	Input (x)		Input (x)	
	0	1	0	1
A	B	C	0	0
B	A	A	0	1
C	D	A	0	1
D	A	D	0	1

Transition Table

	Present State	Next State		Output	
		0	1	0	1
A	00	01	10	0	0
B	01	00	00	0	1
C	10	11	00	0	1
D	11	00	11	0	1

Excitation Table

Present State	Excitation				Output	
	J_1, K_1, J_2, K_2		J_1, K_1, J_2, K_2			
	0	1	0	1	0	1
00	0	-	1	0	-	00
01	0	-	1	0	-	01
10	-	0	1	-	0	01
11	-	1	-	-	0	01

$$J_2 = \bar{X}$$

$$K_2 = \bar{Q}_1 + \bar{X}$$

1	0	-	-
1	0	-	-

-	-	1	1
-	-	0	1

$$J_1 = \bar{Q}_2 X$$

	00	01	11	10
Q_1	0	1	0	0
	-	-	-	-

$$K_1 = \bar{Q}_2 X + Q_2 \bar{X}$$

-	-	0	-
0	1	0	1

$$z = Q_2 X + Q_1 X$$

0	0	1	0
0	1	1	0