Name: Sujan Biswas

Roll No: 30201050100 3

Course: BCSE Lateral

Q) Casecade 2 decade counters (designed from your previous problem) so that it can count through 0-99

This design offers a practical approach to casecading two decade counters, so that it can count through 0-99. The counters outputs are normally low and high only at their respective decoded time slot at high means 0 it represents high counting and at low means 1, it represents low counting. The count is going high from 0 to 99 at high counting and it going to 99 to zero at low counting. For the configuration of casecade two decade counters i.e. from 0-99 every 10 counts on the first IC counter one count on the second IC counter. In this we use clock for up-down counting of pulse of clock. We also use the clear button for reset of the decade counter. After pressing clear botton the decade counter is reset to 00. For represent the count, we use LED display for counting the pulse.. The design is designed by using JK flipflops.

This table for JK flip flop is $S \Rightarrow$

$Q_n \Rightarrow$ present state $Q_{n+1} \Rightarrow$ next state

Q_n	Q_{n+1}	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

	Initial state				Final state				Input Given			
S	Q_4	Q_3	Q_2	Q_1	$\bar{Q}_4$	$\bar{Q}_3$	$\bar{Q}_2$	$\bar{Q}_1$	q_1	q_2	q_3	q_4
0	0	0	0	0	0	0	0	1	1	0	0	0
0	0	0	0	1	0	0	1	0	1	1	0	0
0	0	0	1	0	0	0	1	1	1	0	0	0
0	0	0	1	1	0	1	0	0	1	1	1	0
0	0	1	0	0	0	1	0	1	1	0	0	0
0	0	1	0	1	0	1	1	0	1	1	0	0
0	0	1	1	0	0	1	1	1	1	0	0	0
0	0	1	1	1	1	0	0	0	1	1	1	1
0	1	0	0	0	1	0	0	1	1	0	0	0
0	1	0	0	1	0	0	0	0	1	0	0	1
1	0	0	0	0	1	0	0	1	1	0	0	1
1	0	0	0	1	0	0	0	0	1	0	0	0
1	0	0	1	0	0	0	0	1	1	0	1	0
1	0	0	1	1	0	0	1	0	1	0	0	0
1	0	1	0	0	0	0	1	1	1	0	1	0
1	0	1	0	1	0	1	0	0	1	0	0	0
1	0	1	1	0	0	1	0	1	1	0	1	0
1	0	1	1	1	0	1	1	0	1	0	0	0
1	1	0	0	0	0	1	1	1	1	0	1	0
1	1	0	0	1	1	0	0	0	1	0	0	0

For S = 0;

q_2	$\bar{Q}_2\bar{Q}_1$	$\bar{Q}_2Q_1$	Q_2Q_1	$Q_2\bar{Q}_1$
$\bar{Q}_4\bar{Q}_3$	0 (0)	1 (1)	1 (3)	0 (2)
$\bar{Q}_4Q_3$	0 (4)	1 (5)	1 (7)	0 (6)
Q_4Q_3	d (12)	d (13)	d (15)	d (14)
$Q_4\bar{Q}_3$	0 (8)	0 (9)	d (11)	d (10)

JK for $q_2 = Q_1\bar{Q}_4$

For S = 1,

q_2	$\bar{Q}_2\bar{Q}_1$	$\bar{Q}_2Q_1$	Q_2Q_1	$Q_2\bar{Q}_1$
$\bar{Q}_4\bar{Q}_3$	0 (0)	0 (1)	0 (3)	1 (2)
$\bar{Q}_4Q_3$	1 (4)	0 (5)	0 (7)	1 (6)
Q_4Q_3	d (12)	d (13)	d (15)	d (14)
$Q_4\bar{Q}_3$	1 (8)	0 (9)	d (11)	d (10)

JK for $q_2 = \bar{Q}_1Q_2 + \bar{Q}_1\bar{Q}_3 + \bar{Q}_1Q_4$

For S=0

q_3	$\bar{Q}_2\bar{Q}_1$	$\bar{Q}_2 Q_1$	$Q_2 Q_1$	$Q_2\bar{Q}_1$
$\bar{Q}_4\bar{Q}_3$	0 (0)	0 (1)	1 (3)	(2)
$\bar{Q}_4 Q_3$	0 (4)	0 (5)	1 (7)	0 (6)
$Q_4 Q_3$	d (12)	d (13)	d (15)	d (14)
$Q_4\bar{Q}_3$	0 (8)	0 (9)	d (11)	d (10)

JK for $q_3 = Q_1 Q_2$

For S=1

q_3	$\bar{Q}_2\bar{Q}_1$	$\bar{Q}_2 Q_1$	$Q_2 Q_1$	$Q_2\bar{Q}_1$
$\bar{Q}_4\bar{Q}_3$	0 (0)	0 (1)	0 (3)	0 (2)
$\bar{Q}_4 Q_3$	1 (4)	0 (5)	0 (7)	0 (6)
$Q_4 Q_3$	d (12)	d (13)	d (15)	d (14)
$Q_4\bar{Q}_3$	1 (8)	0 (9)	d (11)	d (10)

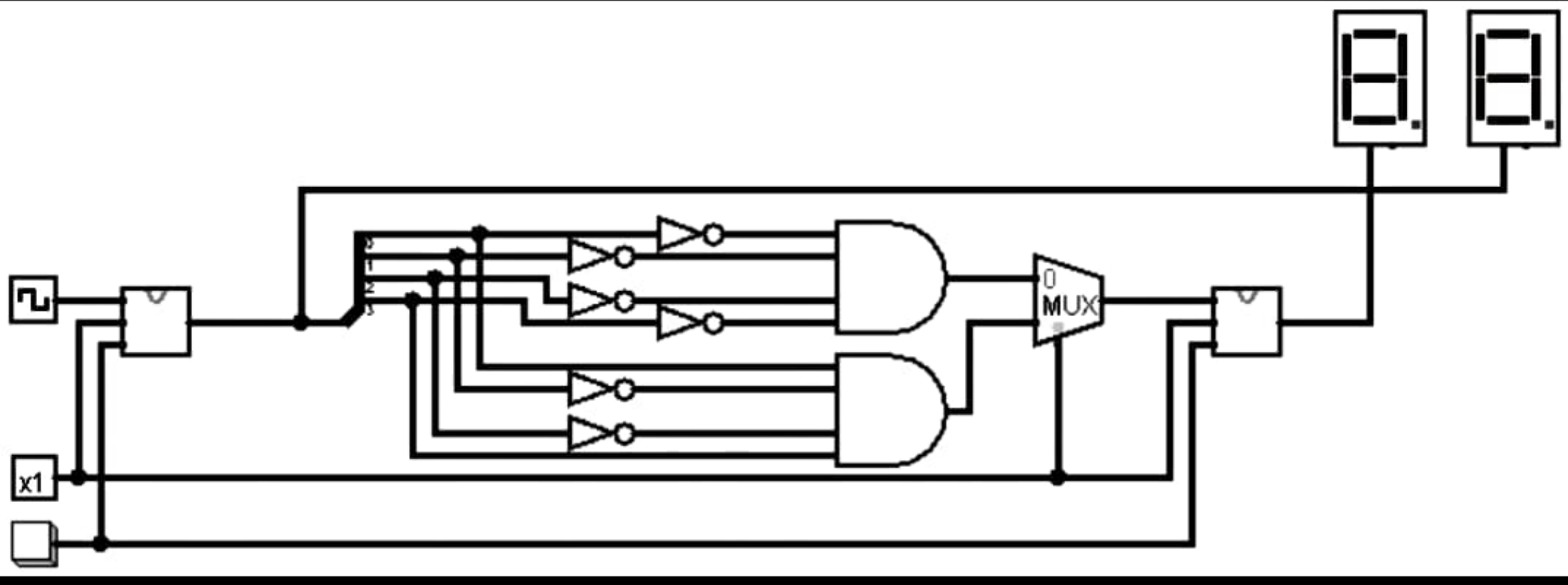
JK for $q_3 = \bar{Q}_1\bar{Q}_2 Q_3 + \bar{Q}_1\bar{Q}_2 Q_4$

q_4	$\bar{Q}_2\bar{Q}_1$	$\bar{Q}_2 Q_1$	$Q_2 Q_1$	$Q_2\bar{Q}_1$
$\bar{Q}_4\bar{Q}_3$	0	0	0	0
$\bar{Q}_4 Q_3$	0	0	1	0
$Q_4 Q_3$	d	d	d	d
$Q_4\bar{Q}_3$	0	1	d	d

JK for $q_4 = Q_1 Q_2 Q_3 + Q_1 Q_4$

q_4	$\bar{Q}_2\bar{Q}_1$	$\bar{Q}_2 Q_1$	$Q_2 Q_1$	$Q_2\bar{Q}_1$
$\bar{Q}_4\bar{Q}_3$	1	0	0	0
$\bar{Q}_4 Q_3$	0	0	0	0
$Q_4 Q_3$	d	d	d	d
$Q_4\bar{Q}_3$	1	0	d	d

JK for $q_4 = \bar{Q}_1\bar{Q}_2\bar{Q}_3$


2
x1
0
MUX