ECS 154A Homework 4

Hardy Jones
999397426
Professor Nitta
Fall 2013

1. Implement the following D flipflop as a JK flipflop.

D

	QX			
	00	01	11	10
00	1	0	0	1
01	1	1	1	0
YZ 11	1	1	1	1
10	0	1	0	0

J

	QX			
	00	01	11	10
00	1	0	d	d
01	1	1	d	d
YZ 11	1	1	d	d
10	0	1	d	d

$$J = Z + \overline{X}\,\overline{Y} + XY$$

K

	QX			
	00	01	11	10
00	d	d	1	0
01	d	d	0	1
YZ 11	d	d	0	0
10	d	d	1	1

$$K = X\overline{Z} + Y\overline{Z} + \overline{X}\,\overline{Y}Z$$

2. Implement the following D flipflop as a T flipflop.

D

	QX			
	00	01	11	10
YZ 00	0	0	1	1
01	1	1	0	0
11	1	1	0	0
10	0	0	1	1

T

	QX			
	00	01	11	10
YZ 00	0	0	0	0
01	1	1	1	1
11	1	1	1	1
10	0	0	0	0

$$T = Z$$

3. Implement the state diagram using D flipflops. Show the state transition table, state encoding, k-maps, and equations.

(a) State transitions

Current	X_1	X_0	Next
A	d	0	B
A	d	1	A
B	0	0	B
B	0	1	D
B	1	0	D
B	1	1	B
C	0	0	C
C	d	1	D
C	1	0	A
D	0	D	C
D	1	D	D

Output

State	Z_1	Z_0
A	0	0
B	0	1
C	1	0
D	0	0

(b) State encoding

2

Current		Input		Next	
S_1	S_0	X_1	X_0	S_1'	S_0'
0	0	d	0	0	1
0	0	d	1	0	0
0	1	0	0	0	1
0	1	0	1	1	1
0	1	1	0	1	1
0	1	1	1	0	1
1	0	0	0	1	0
1	0	d	1	1	1
1	0	1	0	0	0
1	1	0	d	1	0
1	1	1	d	1	1