# Homework Assignment #7

Reading Assignment:
Chapter 4 in the textbook <u>Logic and Computer Design Fundamentals, 5th Edition</u> by Mano
Online supplement "Design and Analysis using JK and T Flip-Flops"
    (<u>http://wps.pearsoned.com/ecs_mano_lcdf_5/</u>)

Problem Assignment:
1) Chapter 4 problems: 4, 5, 7, 8, 10, 11, 13
2) Problems 4 and 5 in the online supplement "Design and Analysis using JK and T Flip-Flops." These
   problems are also shown below. Note: Problem 4 should refer to the figure shown below, not
   Figure 6-40, in the text.

    4.   *Design a sequential circuit for the state diagram given in Figure 6-40 of the
          text (see Reference 1) using *JK* flip-flops.

    5.   *Design a sequential circuit with two *JK* flip-flops *A* and *B* and two inputs *E*
          and *X*. If $E = 0$, the circuit remains in the same state, regardless of the value
          of *X*. When $E = 1$ and $X = 1$, the circuit goes through the state transitions
          from 00 to 01 to 10 to 11, back to 00, and then repeats. When $E = 1$ and $X = $
          0, the circuit goes through the state transitions from 00 to 1 to 10 to 01, back
          to 00, and then repeats.
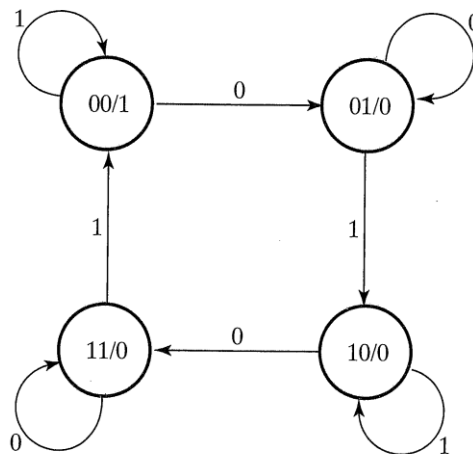
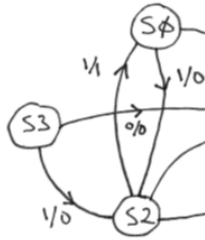## Selected Answers (Partial Solutions):
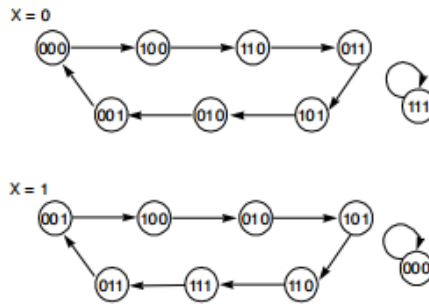4-4)

4-5)
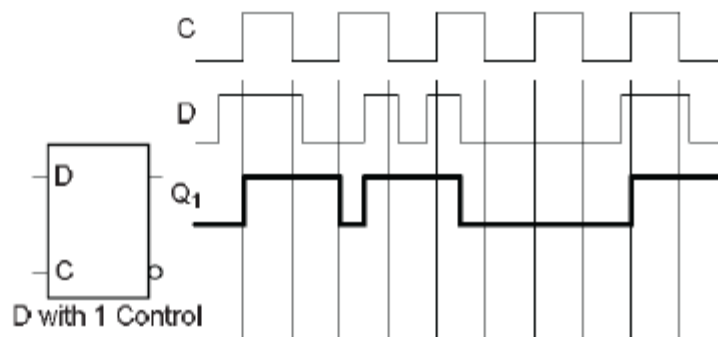
S0 - 00
S1 - 01
S2 - 10
S3 - 11

4-7.*

Present state			Input	Next state		
A	B	C	X	A	B	C
0	0	0	0	1	0	0
0	0	0	1	0	0	0
0	0	1	0	0	0	0
0	0	1	1	1	0	0
0	1	0	0	0	0	1
0	1	0	1	1	0	1
0	1	1	0	1	0	1
0	1	1	1	0	0	1
1	0	0	0	1	1	0
1	0	0	1	0	1	0
1	0	1	0	0	1	0
1	0	1	1	1	1	0
1	1	0	0	0	1	1

State diagram is the combination of the above two diagrams.

4-8)
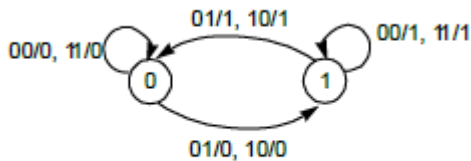
Format: XY/S

4-13.*

Present state		Input	Next state	
A	B	X	A	B
0	0	0	0	0
0	0	1	1	0
0	1	0	0	1
0	1	1	0	0
1	0	0	1	0
1	0	1	1	1
1	1	0	1	1
1	1	1	0	1

$D_A = A\bar{X} + \bar{B}X$

$D_B = AX + B\bar{X}$

Logic diagram not given.

Online Supplement Problem 4) JA = KA = XB,   JB = X', KB = X
Online Supplement Problem 5) JA = KA = EXB + EX'B',   JB = KB = E