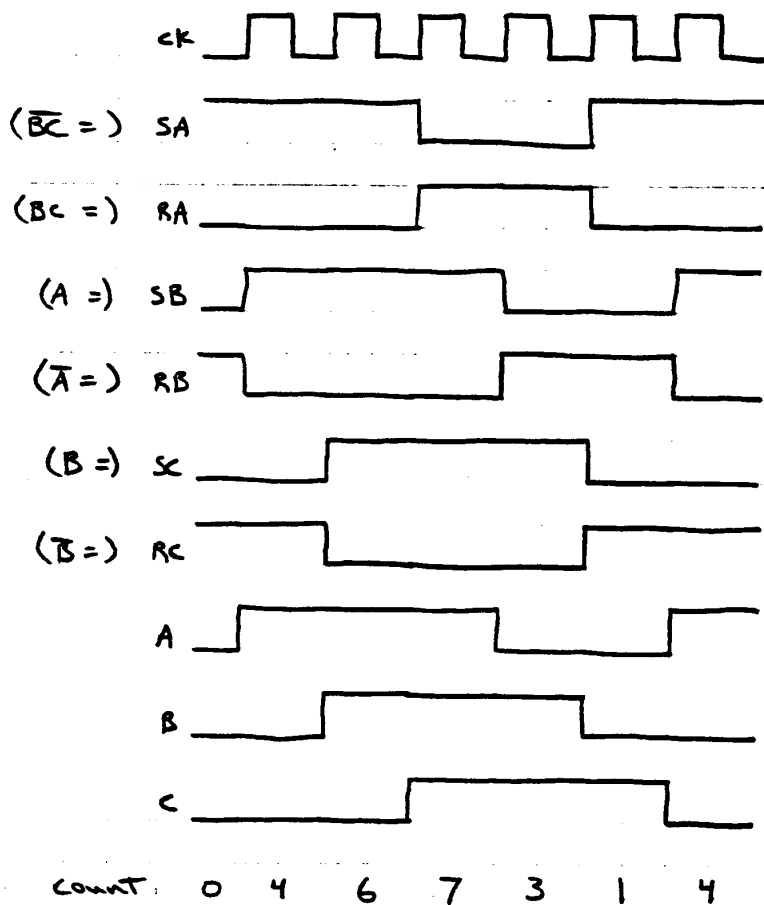
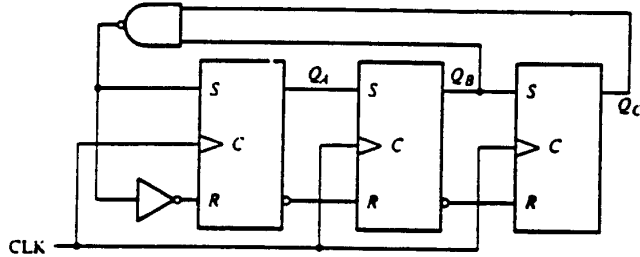


Solution to Homework #7

Problem Assignment:

- Use a timing diagram to determine the counting sequence for the counter shown in Figure 1 (next page) if the counter begins with count 0. As a minimum, include waveforms for the input clock, SA, RA, SB, RB, SC, RC, QA, QB, and QC. QA is the MSB.



↑ repeat

COUNT = 0, 4, 6, 7, 3, 1, 4, 6, 7, 3, 1, 4, 6, 7, 3, 1, etc
 Repeated

2. Chapter 7 problems 5, 6, 8, 11, 14, 15, 16.

7-5.*

Q_2 remains connected to MUX data input 0. Connect D_1 to MUX data input 1 instead of Mux data input 3. Connect Q_{i-1} to MUX data input 2 instead of MUX data input 1. Finally, 0 is connected to MUX data input 3.

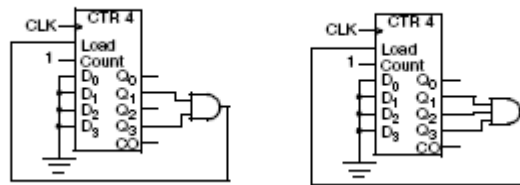
7-6.*

- a) 1000, 0100, 0010, 0001, 1000. ...
- b) # States = n

7-8.

- a) 8
- b) 3

7-11.



7-14.*

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

a) $D_B = C$ b) $D_A = BC + A\bar{C}$
 $D_C = \bar{B}\bar{C}$ $D_B = \bar{A}\bar{B}C + B\bar{C}$
 $D_C = \bar{C}$

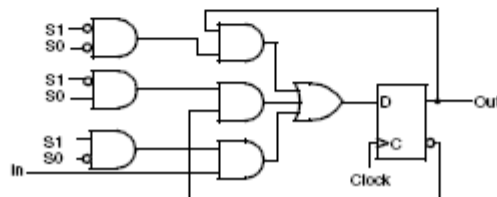
7-15.

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

$D_A = A\bar{B} + A\bar{C} + \bar{A}BC$
 $D_B = \bar{B}$
 $D_C = \bar{B}C + B\bar{C}$

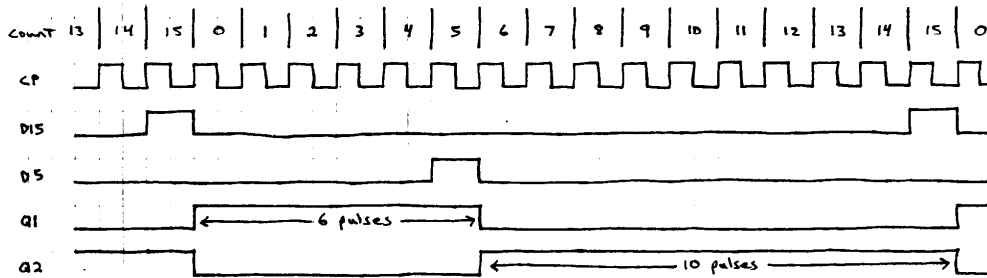
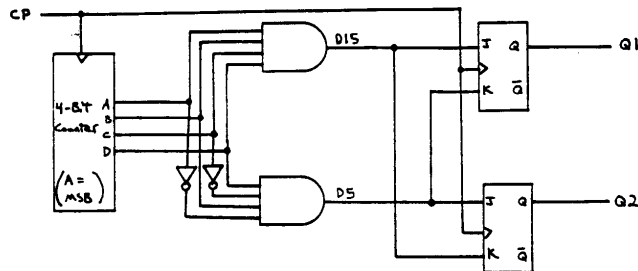
7-16.

The basic cell of the register is as follows:

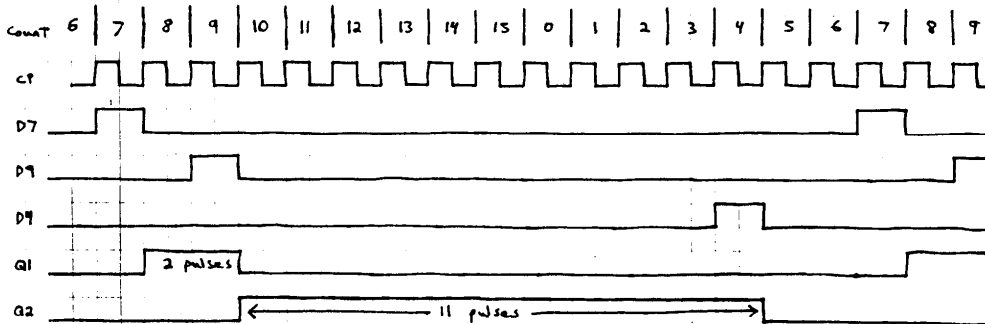
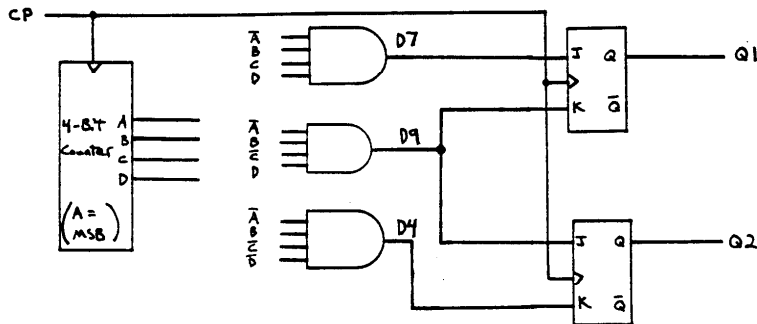


3. A) Sketch the waveforms CP, A, B, C, D, Q1, and Q2 for the circuit shown below.
- B) For how many clock pulses is Q1 HIGH? For how many clock pulses is Q2 HIGH?
- C) Modify the circuit so that Q1 goes HIGH at the end of count 7 and stays HIGH for 2 clock pulses. Q2 should go HIGH at the end of count 9 and remain HIGH for 11 clock pulses.

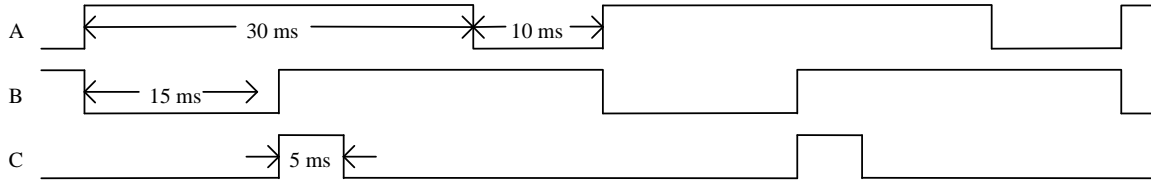
3 Original Circuit: Decoder outputs labeled D5 and D15.



Designed Circuit:



4. Design a circuit to produce the following waveforms:



Length of period = 40 ms
Smallest increment needed = 5ms, so 8 counts are needed

