Physics 314

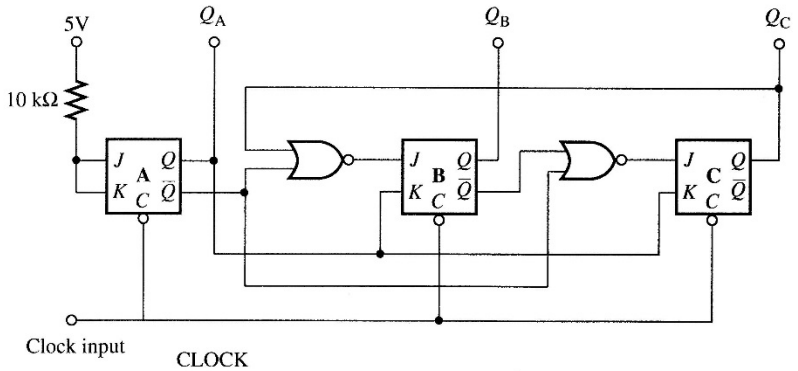
Assignment 3, due Tuesday, Nov 8 2016

Topics: Flip-flops, counters; digital readouts

Problems to hand in:

1) What are the advantages and disadvantages of the synchronous counter compared to the ripple counter?

2) Work through the truth table for the counter shown below to show that it is correct. Hint: start with the initial values for the J's, K's, Q's, and $\overline{Q}$'s. Then see how the first clock changes the Q's and $\overline{Q}$'s. Then figure out the new J's and K's. Then repeat for the second clock cycle. Keep going till you've verified the whole table (yes, it's a fair amount of work, but I hope it'll help you better understand flip-flop and counter behavior).



CLOCK PULSE (state)	J_A Q_A K_A	J_B Q_B K_B	J_C Q_C K_C
1 (Reset)	1 0 1	0 0 0	0 0 0
2	1 1 1	1 0 1	0 0 1
3	1 0 1	0 1 0	0 0 0
4	1 1 1	1 1 1	1 0 1
5	1 0 1	0 0 0	0 1 0
6	1 1 1	0 0 1	0 1 1
7	0	0	0

3) Design two divide by 4 counters, one synchronous, one ripple. (use JK flip-flops).