Lab #11

Name: _____ Per: _____

Title: J-K FLIP-FLOPS

Materials:
[1] 7476
[1] clock (single pulses)

Procedure:

1. Insert the 7476 into the breadboard.
2. Wire the asynchronous inputs PS and CLR to two switches. Wire the synchronous inputs J and K to switches and the CLK input to a single-pulse clock (see Instructor if clock is not hooked up or working).
3. Operate the asynchronous inputs PS and CLR and record the results in Table 11-1. Also, write the condition in the last column. **Get Instructor's Signature.**
4. Operate the synchronous inputs J, K, and CLK of the 7476 according to Table 11-2. Observe and record results. **Get Instructor's Signature.**

Questions (answer on a separate piece of paper – **"Draw" means you must use a template**):

1. **Draw** a logic symbol for a J-K flip-flop. Label the inputs J, K, CLK, PS, and CLR and the outputs Q and $\overline{Q}$.
2. What are the synchronous inputs of the J-K flip-flop?
3. What are the asynchronous inputs of the J-K flip-flop?
4. What type of triggering does the 7476 use?
5. The truth table for the asynchronous inputs is the same as for what other flip-flop we have used?
6. The inverter bubbles at the PS and CLR inputs of the 7476 mean that a logical _____ will disable these asynchronous inputs and enable the synchronous inputs.
7. What is the meaning of the inverter bubble on the clock input of the 7476?
8. What is meant by the "toggle" position of the flip-flop(i.e., what happens to the LED's in toggle mode)? Also, what must PS, CLR, J, and K be in order for the FF to be in toggle mode?
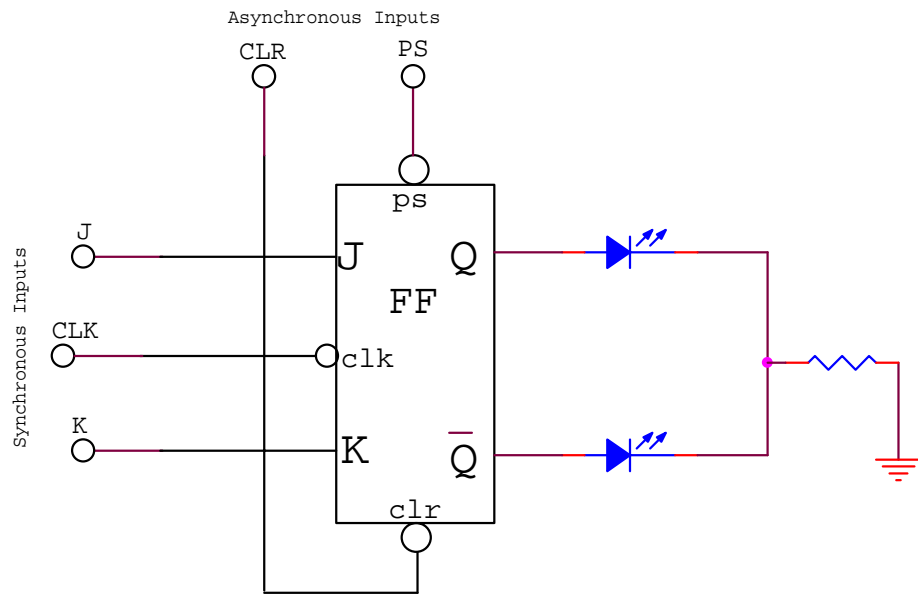
CLR   PS

Synchronous Inputs

J

CLK

K

ps

J   Q

FF

clk

K $\overline{Q}$

clr

Fig. 6-7   J-K Flip-Flop

Inputs		Outputs		
Preset	Clear	Q	$\overline{Q}$	Name of Condition
0	0			*Prohibited*
0	1			
1	0			
1	1			
				Clear Q to 0, Preset Q to 1, Disable asynchronous inputs

Table 11-1 TT for 7476 JK Flip-Flop

(asynchronous inputs)

Table 11-2 TT for the 7476 flip-flop

Inputs			Outputs				
Clock	Data		Before Clock Pulse		After Clock Pulse		Name of Condition
CLK	J	K	Q	$\overline{Q}$	Q	$\overline{Q}$	
↑	0	0	0	1			
↑	0	1	0	1			
↑	1	0	0	1			
↑	1	1	0	1			
↑	0	0	1	0			
↑	0	1	1	0			
↑	1	0	1	0			
↑	1	1	1	0			
							hold, reset, set, or toggle