

ECE 204L - FLIP-FLOPS AND LATCHES - LAB 19 FLIP-FLOP EQUATIONS

WINTER 2004

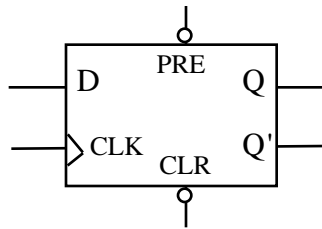
A.P. FELZER

OBJECTIVE

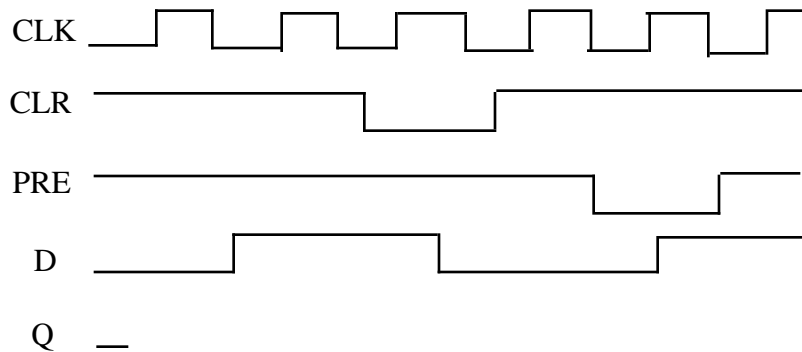
The main objective of this lab is to obtain the function tables and excitation equations for flip-flops.

LAB

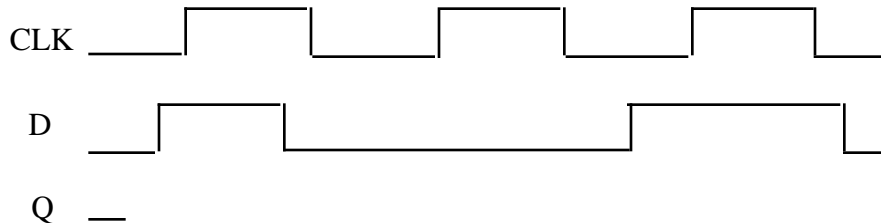
1. Given the following D flip-flop



- a. What are PRESET and CLEAR - what do they do
- b. Explain how to PRESET and how to CLEAR the above flip-flop
- c. Complete the following timing diagram for the above flip-flop

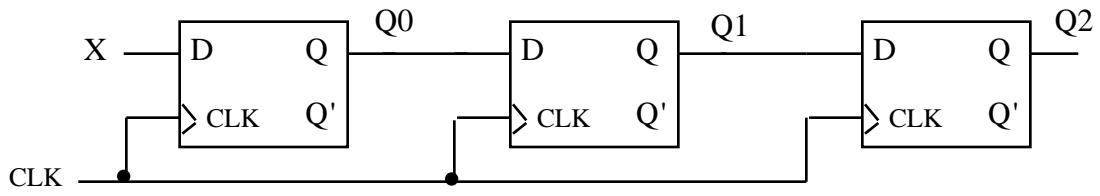


- d. Take measurements to complete the following timing diagram. Be sure to implement the clock with a debouncer circuit made with momentary switches like you did in Lab 17

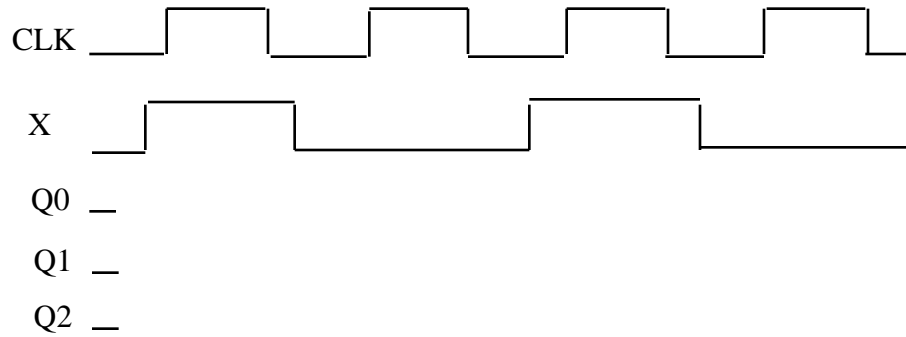


- e. Use your timing diagram in part (d) to obtain the function table of your D flip-flop
- f. Use your function table in part (e) to obtain the next state equation of your D flip-flop - the equation for Q^*

2. Given the following shift register



a. Take measurements to complete the following timing diagram



Hint - build and test the shift register one stage at a time. As always be sure to use a switch debouncer for the clock

b. Describe in words what's going on in the shift register