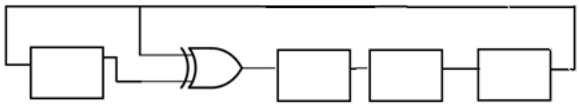
Problem 1

For this problem your task is to design and implement a 3 bit synchronous Gray code counter that goes through the following sequence: 0, 1, 3, 2, 6, 7, 5, 4 and back to 0.

1. Draw the state diagram of this counter.
2. Draw the timing diagram of this counter showing at least 8 clocks.
3. Find the state table using D Flip flops.
4. Simplify the input equations for all the different Flip flops.
5. Draw the hardware as neatly as possible.
6. Can you guess what the special thing about this counter is?

Problem 2

The following Linear Feedback Shift Register (LFSR) is created out of 4 D-Flip Flops that are sensitive to a positive clock edge and a Xor gate



1. Find the state table of this LFSR assuming it was initialized to 1 0 0 0 using asynchronous inputs
2. What will happen if the LFSR was initialized to 0 0 0 0 instead of 1 0 0 0.