Indian Institute of Technology, Delhi
EEL 201: Digital Electronic Circuits
Tutorial 6, 14th September, 2009

1. The circuit in Fig. 1 is a positive edge triggered flip-flop. Analyze its behavior and decide what kind of flip-flop it is.

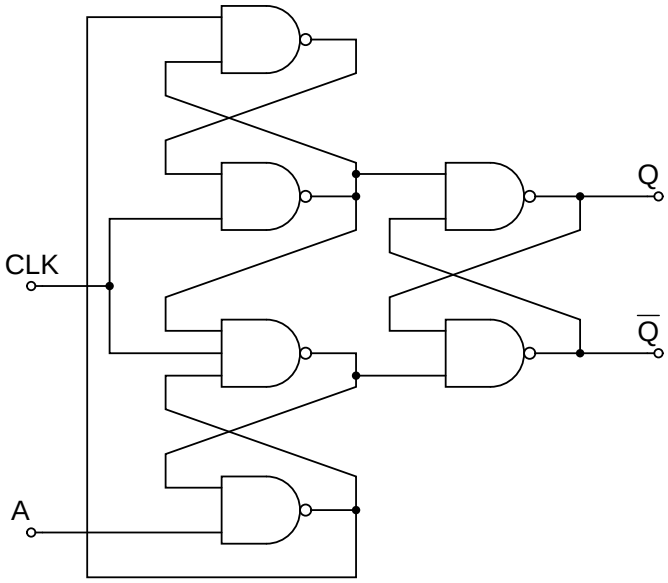

Figure 1:

2. Write out the state table for a BCD (modulo-10) synchronous counter. From the state table, design the complete sequential circuit using J-K flip-flops.

3. Design the above synchronous BCD counter using T-flip-flops.

4. Design a mod-8 synchronous up-down counter. The circuit will have one input, x. If x is 1, the counter will cycle from 0 through 7, and back to 0 (i.e, it will count upwards.) When x is 0, the counter will cycle from 7 through 6, 5, 4 etc. to 0, and then will go back to 7 (i.e, it will count downwards).

5. Design a one-input, one-output serial 2's complementer. The circuit accepts a string of bits from the input and generates the 2's complement at the output. The circuit can be reset asynchronously to start and end the operation.