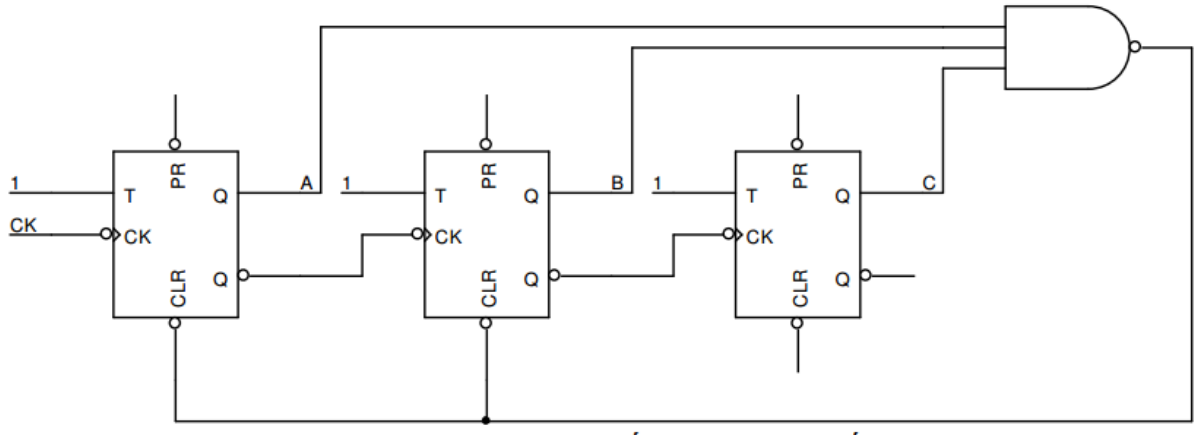
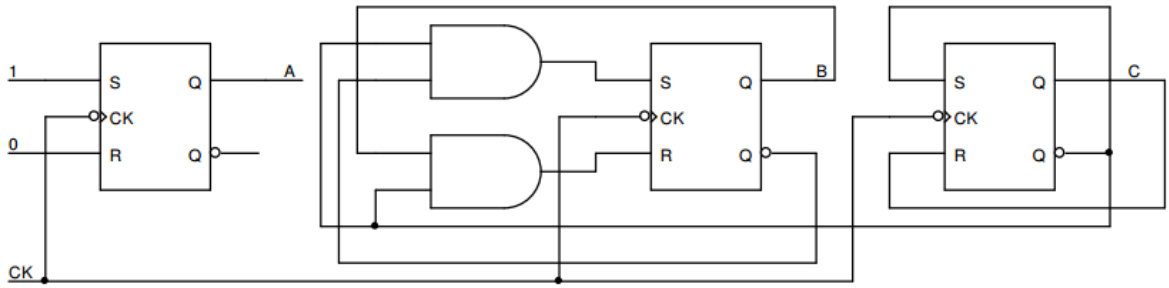
1. Analyze the given counter and plot the wave form depend on CLOCK pulse (at least 8 CLOCK pulse).

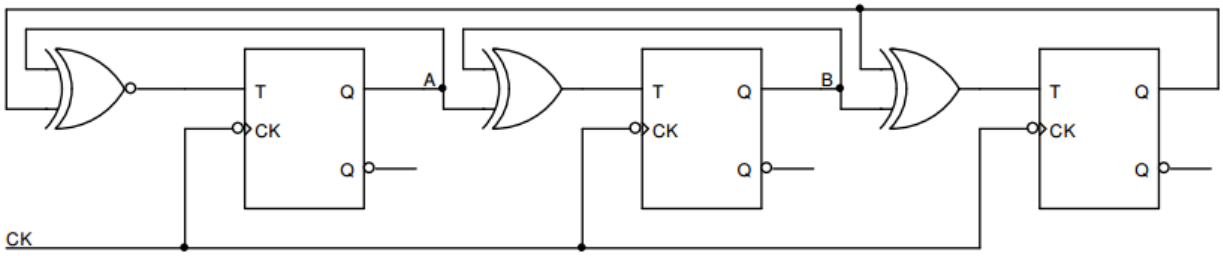


2. Build the excitation and plot the state diagram of the counter below.



Is this circuit being able to self-working?

3. Give the logic circuit below:



a) Implement input function for each FF.

b) Describe how the circuit works?

4. The function F has 4 variables A, B, C, D. The value of F is 1 if the decimal value of variables divides 3 or 5 without remainder, otherwise F = 0.

a) Implement F by using 2-input logic gate.
b) Implement F by using a MUX 8 to 1 and logic gates (if necessary).
c) Implement F by using a MUX 4 to 1 and logic gates (if necessary).
d) Simplify F and implement F using the Half-Adders.

5. Design a logic circuit that counting depend on input control P. If P = 1 the circuit count $0 \rightarrow 1 \rightarrow 3 \rightarrow 5 \rightarrow 7 \rightarrow 1$ and when P = 0 the circuit count $0 \rightarrow 2 \rightarrow 4 \rightarrow 6 \rightarrow 2$.

a) Using JK FF.
b) Using T FF.