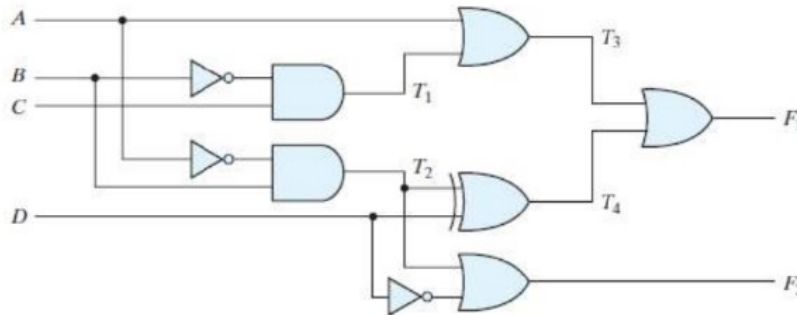


**IMPORTANT:** Note that all of these should also be implemented on Logisim and submitted, in addition to the paper assignments. If We find out that any assignment solutions are the same/copied from one another, those all will get a 0!

**Q1.** Consider the combinational circuit shown in *Figure 1*

**5 CO2**

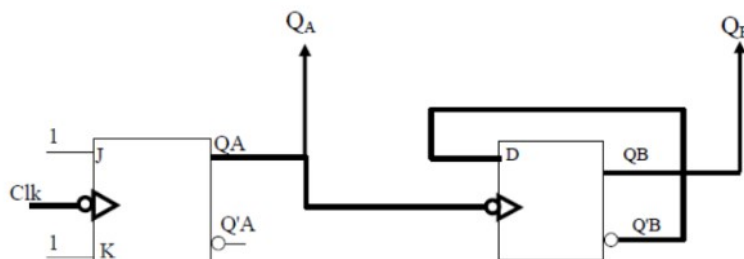


**Figure 1**

- Derive the Boolean expressions for  $T_1$  through  $T_4$ . Evaluate the outputs  $F_1$  and  $F_2$  as a function of the four inputs.
- List the truth table with 16 binary combinations of the four input variables. Then list the binary values for  $T_1$  through  $T_4$  and outputs  $F_1$  and  $F_2$  in the table.
- Plot the output Boolean functions obtained in part (b) on maps and show that the simplified Boolean expressions are equivalent to the ones obtained in part (a).

**Q2.** A D flip-flop and a JK flip-flop are connected as shown in figure 2. Complete the timing diagram for  $Q_A$  and  $Q_B$ . (Assume  $Q_A$  and  $Q_B$  initially 0)

**5 CO4**



**Figure 2**