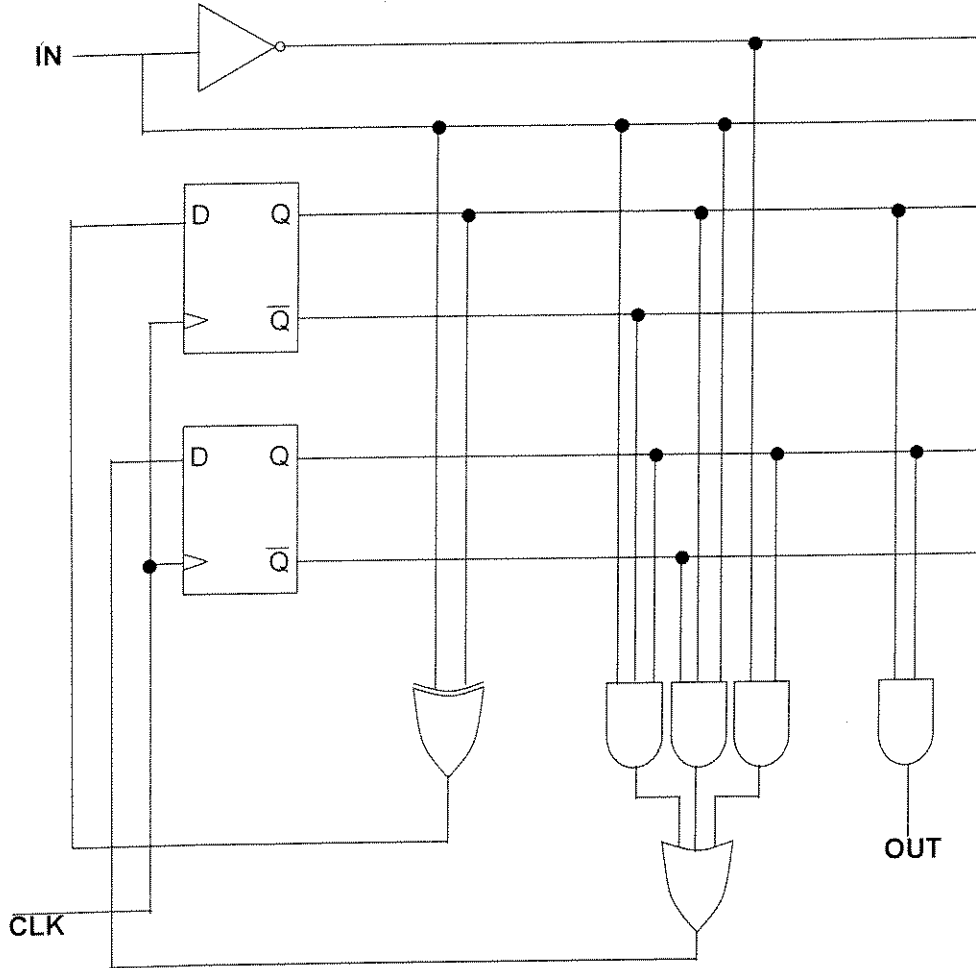


Digital Logic Qualifying Exam

Question 1. (5 points) State DeMorgan's Theorem of Boolean Algebra. In your statement of the theorem, include both of the equations that are involved in this theorem.

Question 2. (5 points) Consider the function $F = \bar{X}\bar{Y}\bar{Z} + X\bar{Y}\bar{Z}$. Draw the associated Karnaugh map, and use the Karnaugh map to minimize the expression. Show your work.

Question 3. (5 points) Give the state table and state diagram for the sequential circuit that is shown below. Also, state whether or not this sequential circuit is a Moore machine, and explain why. Make sure your answers are properly labeled. Note that this circuit contains *D* flip-flops, *and* gates, one *or* gate, one *xor* gate, and one inverter.



Question 4. (5 points) Consider an 8-bit read-only memory (ROM) device that takes a 3-bit address, and delivers a 1-bit output. Use one such ROM component to implement the function $f = ab + \bar{b}c$. Clearly label your implementation, and show the contents of the ROM component that is used.