PHY 233 Quiz II

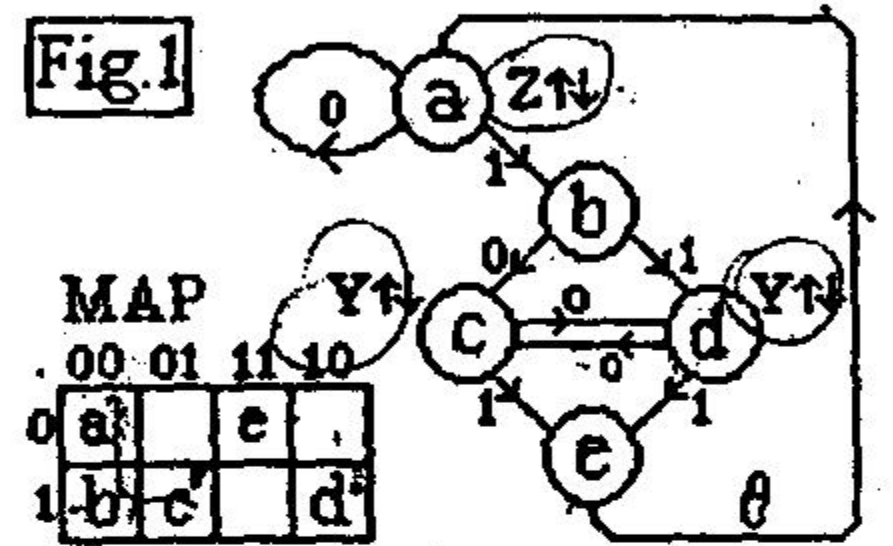*Note: Programmable Calculators and Cellular phones IS NOT allowed.*

1. For the state transition diagram show to what extent the state assignment (shown in map) satisfies the four principles. State (a) has output (Z) whereas states (B) and (C) have output (Y).
   Show your work explicitly. *(20 pts.)*

2. For the state transition diagram shown
   a. Reduce the number of states by the method of grouping.
   (Note: No points for other methods) *(15 pts.)*
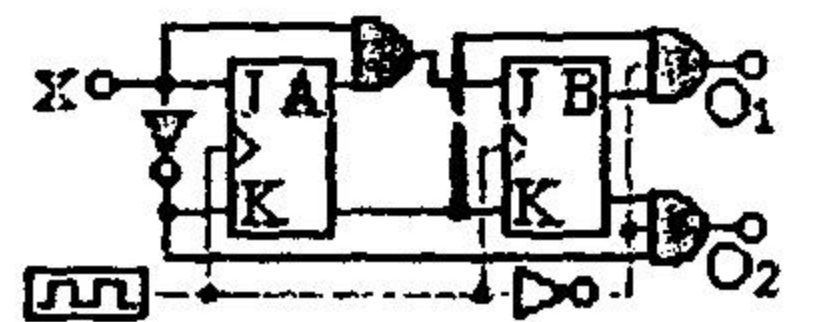   b. Draw the reduced state transition diagram. *(5 pts.)*
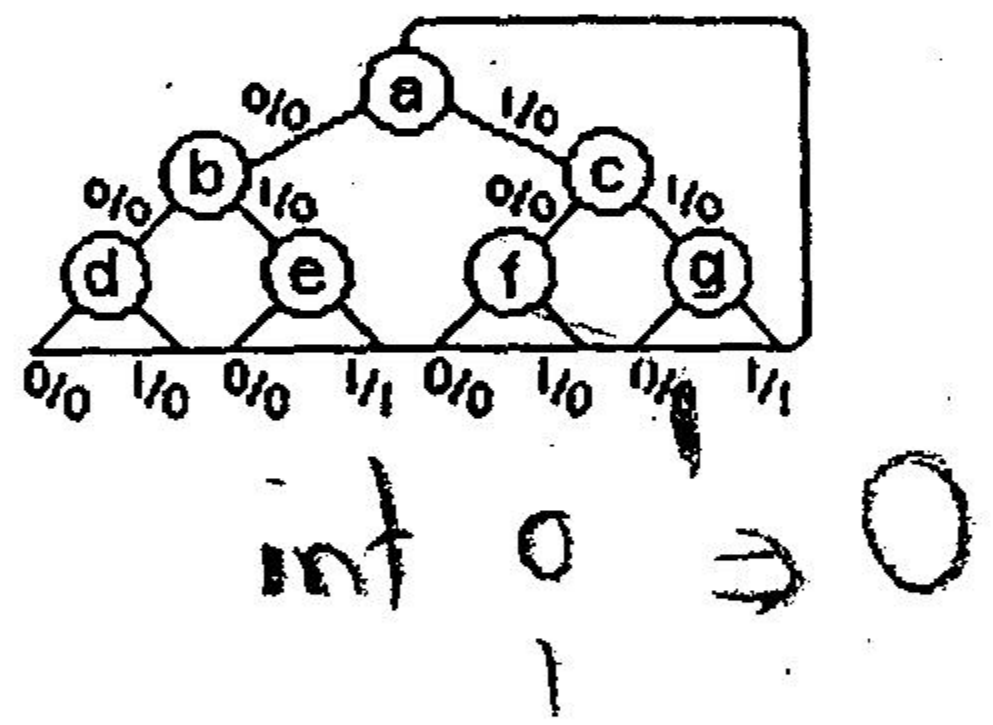
3. Answer TWO of the following three questions: *(2x15 = 30 pts.)*

3A. Identify the circuit shown. Mention the roles of the three Inverters, Transistor, Capacitor, Flip Flop, and the blank block.
   Why do you think isn't the clock terminal of the Flip-Flop directly connected to the Master Clock (MC)?
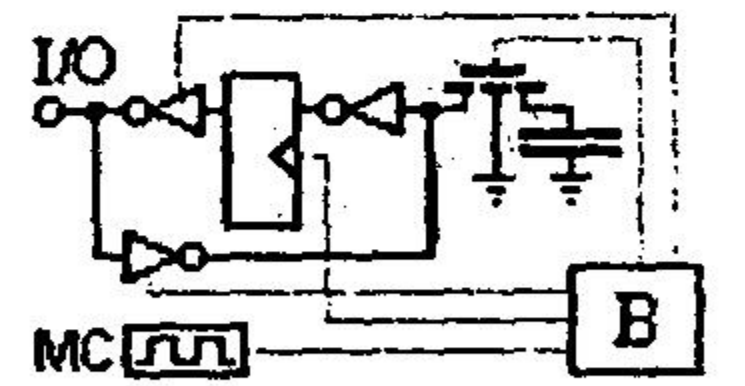
3B. For the state machine shown in the figure: Prepare the next state table and draw the transitions on the incomplete diagram shown. Which, if any, of the two outputs (O_1 and O_2) is conditional? What is the role of the inverter connected between the clock and the 3-bit AND gates?

3C. The figure shows the state assignment for the state transition diagram shown in Fig.1. Prepare the next state table (Name the input (x) for uniformity in the answers).
   Draw the Karnaugh Map for D_B (only, no points for extra maps) and then convert that map to Karnaugh maps for J_B and K_B.

4. Answer 4 of the following 7 questions briefly: *(4x7.5 = 30 pts.)*

   a. How many 16x4Bit memory chips (our own 74189) are needed to construct a 1Kx16-Bit memory?

   b. Draw the block diagram of a ROM implemented State Machine.

   c. In methods of state minimization, what is the advantage of the Grouping over Line Comparison?

   d. Why is the IFL of a Decade counter more complicated than a Binary MOD16 counter?

   e. Give an example where is it necessary to use Tri-state chips.

   f. What is the number of DISTINCT state assignments for an ASM of just THREE states? Justify your answer graphically or algebraically. *(No points for "shalf")*

   g. What is the advantage in using a One-Hot state Machine? What is the price paid?

Good Luck!

2x20 + 2x30 = 100