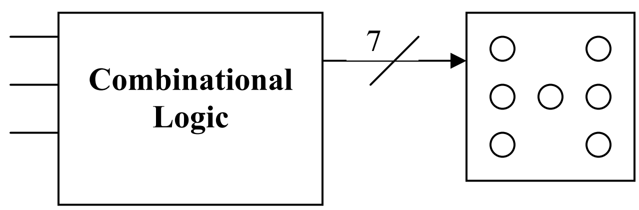
Universidad de Puerto Rico
Recinto Universitario de Mayagüez

INEL 4206 – Microprocesadores

Primavera 2003

Ejercicios de práctica
Examen Parcial I

1. **Combinational Logic**. Provide two alternative designs for a combinational circuit to control a Dice LED display. The display has one input for each of 7 LED lights. The combinational circuit must map three inputs encoding a binary representation of a number between 0 and 6 into the 7 control signals controlling the LED's. Design one should use traditional K-Map techniques and should be based on logic gates. The second design should use a ROM or PLA.



2. **Sequential Circuits**. Develop a 3-bit binary cyclic counter using D-Flip-Flops and connect it to the dice display developed in exercise 3 in order to make the display count as follows: 0,1, 2, 3, 4, 5, 6, 0, 1, 2, ...

3. **CMOS**. Implement the following logic functions using CMOS technology:
   a. $F(A,B) = not(A \cdot B)$
   b. $F(A,B) = (A \cdot B)$
   c. $F(A,B) = (A + B)$
   d. $F(A,B) = (A \otimes B)$
   e. $F(A,B,C) = (AC + BC + AB)$

4. **Turing Machines**. Modify the example Turing Machine discussed in class which recognized the language $a^n b^n$ in order to recognize the following languages. You only need to show the changes to the finite state machine.
   a. $a^n c b^n$
   b. $(a^n c b^n)^m$

5. Easy I Assembly Language. Write Easy I assembly language programs to solve the following problems:
   a. Compute the product of two number by repetitive addition
   b. Compute de quotient of two numbers by repetitive subtraction
   c. Determine if a number if prime

Remember to work on the practice problems on information theory and coding distributed in class.