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.

![Combinational Logic Diagram]

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. \( F(A, B) = \overline{A \cdot B} \)
   b. \( F(A, B) = A \cdot B \)
   c. \( F(A, B) = A + B \)
   d. \( F(A, B) = A \oplus B \)
   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.**