Combinational Logic Circuit Design

Objective:

To design and implement a circuit that detects all of the Fibonacci numbers between 0 and 15.

Preparation:

1. Determine the number of inputs required for the logic circuit.
2. Construct a truth table for the corresponding logic function.
3. Derive the minimum SOP expression.
4. Draw the corresponding AND-OR circuit.
5. Derive the minimum POS expression.
6. Draw the corresponding OR-AND circuit.

Procedure:

The Fibonacci Series is a sequence of integer values in which one Fibonacci number is equal to the sum of the two previous Fibonacci numbers. The series begins with the values 0 and 1, and all following values are determined as previously specified. An equation which defines each of the values in the Fibonacci Series (following 0 and 1) is given below:

\[ F_n = F_{n-1} + F_{n-2} \]

The first seven Fibonacci numbers are given below:

0, 1, 1, 2, 3, 5, 8, …

Additional information about the Fibonacci Series can be found at “http://en.wikipedia.org/wiki/Fibonacci_number”

You are to:

1. Design a logic circuit that outputs a logic 1 for all Fibonacci numbers, and a logic 0 otherwise; consider, only, values between 0 and 15.

2. Build the circuit using the standard logic gates provided in your parts list.

3. Demonstrate the circuit to the TA.