Sistemas Digitais

Sequential Synchronous Circuits

1. The XY edge-triggered flip-flop keeps the state0 if X=0 and in state 1 if Y=1, changes from 0 to 1 if X=1 and from 1 to 0 if Y=0.

   (a) Draw tha state transition table for flip-flop XY

   (b) Draw the state diagram (ASM model)

   (c) Project the flip-flop XY with

      i. a flip-flop JK

      ii. a flip-flop T

      iii. a flip-flop D

2. Project the circuito that generates the sequence presented in Figure 1, using edge-triggered flip-flops D.

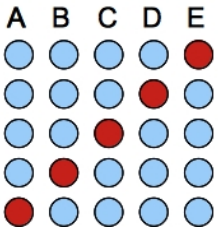

Figure 1: Sequence to be generated

3. Figure 2 represents the state transition diagram of a sequential circuit. Using flip-flops T, project the circuit e describe its behavior.

4. Using flip-flops T, project and implement a circuit that presents the value **1** as output when the sequence **110010** is detected.

5. Project um module 7 counter using:

   (a) flip-flops D

   (b) flip-flops JK

6. Consider the circuit of Figure 3.

   (a) Simplify the function.

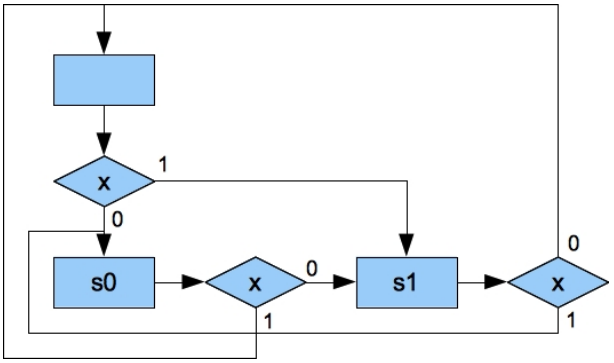

Figure 2: Diagrama de estados de um circuito sequencial síncrono

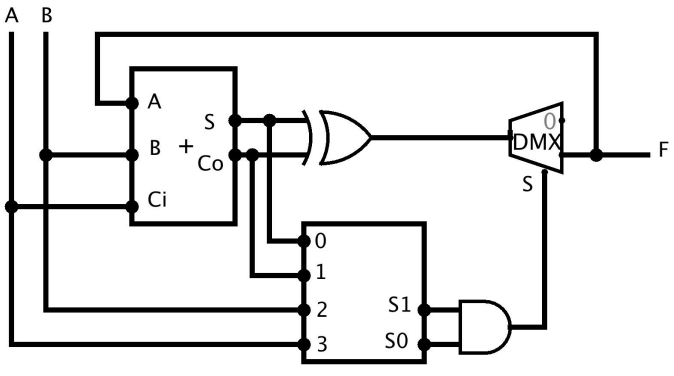

Figure 3: Sequential circuit

(b) Draw the state transition table.

(c) Draw the state transition diagram.

(d) Implement the function F using flip-flops SR.

7. Project a module 4 counter that generates the sequence 3, 6, 1, 4 using flip-flops D.

8. A de-pressurization system of a submarine is made of a motor (M) that levels the pressure existent on the inside and in the outside, by a pressure sensor (PS) that has the value 1 when the pressure is leveled, and by a sensor (DC) that has the value 1 when all doors are closed. The motor is only actuated when all doors are closed and it stops when the pressure is leveled.

   (a) Draw the ASM model of the circuit and state transition table.

   (b) Draw the corresponding sequential circuit using flip-flops D.