

Solutions - Quiz 3

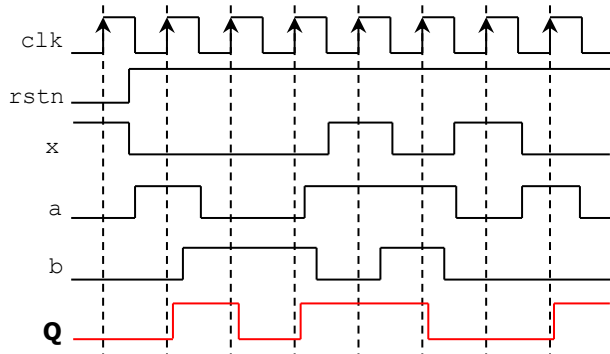
(March 24th @ 5:30 pm)

PROBLEM 1 (35 PTS)

- Complete the timing diagram of the circuit whose VHDL description is shown below:

```
library ieee;
use ieee.std_logic_1164.all;
```

```
entity circ is
  port ( rstn, a, b, x, clk: in std_logic;
        q: out std_logic);
end circ;
```



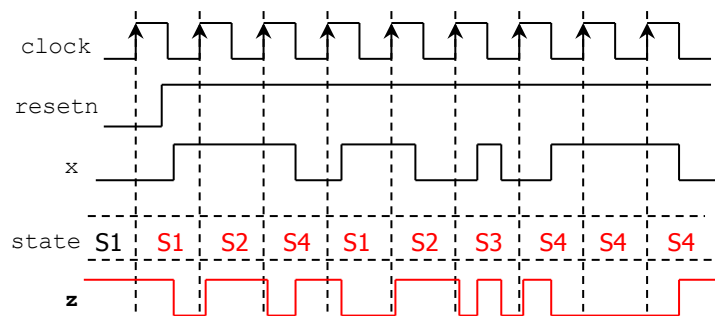
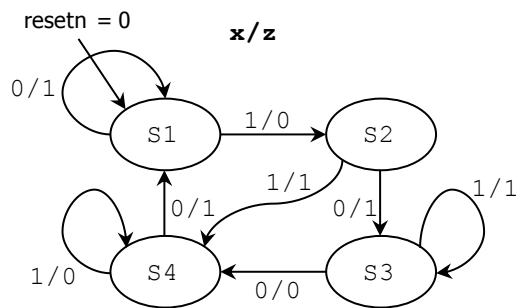
```
architecture xst of circ is
  signal qt, f: std_logic;
begin
  process (rstn, clk, a, b, x)
  begin
    if rstn = '0' then
      qt <= '0';
    elsif (clk'event and clk = '1') then
      if x = '0' then
        qt <= qt xor (a or b);
      end if;
    end if;
  end process;
  q <= qt;
end xst;
```

- Get the excitation equation for q (5 pts).

$$q(t+1) \leftarrow \bar{x}(q(t) \oplus (a + b)) + xq(t)$$

PROBLEM 2 (30 PTS)

- Complete the timing diagram of the following state machine:



PROBLEM 3 (35 PTS)

- Complete the timing diagram of the following circuit. $Q = Q_3Q_2Q_1Q_0$

