Digital Logic

CS207 Assignment 3

Due on 23:55, Nov. 29, 2022

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Assignment Notes

- Write neatly according to the answer template and submit an e-copy to Sakai on time.
  - You can finish the theory questions on a paper, scan it and paste into the template.
- Do write down all procedures. Only presenting the final answer will lead to a zero, even the answer is correct.
- Do double-check your submitted file. No re-submission is allowed for student reasons, e.g., corrupted file uploaded.
- Box answers when applicable.
- Draw logic diagrams with a pen or any software applicable.
- Turn assignments in early if possible.
- This document accounts for 100% of the assignment.
- Request to regrade will lead to a complete regrade on all questions in the assignment. Final grades may increase or decrease.

Question 1

- (20 points) A PN flipflop has four operations: clear to 0, no change, complement, and set to 1, when inputs P and N are 00, 01, 10, and 11, respectively.

  1 Tabulate the characteristic table.
  2 Derive the characteristic equation.
  3 Tabulate the excitation table.
  4 Show how the PN flipflop can be converted to a D flipflop.

Question 2

- (20 points) A sequential circuit has two JK flip-flops A and B and one input x. The circuit is described by the following flip-flop input equations: $J_A = x'$, $K_A = B$, $J_B = x$, $K_B = A'$.
  1. Derive the state equations $A(t+1)$ and $B(t+1)$ by substituting the input equations for the J and K variables. raw the state diagram of the circuit.

Question 3

- (20 points) A sequential circuit has two JK flipflops A and B, two inputs x and y, and one output z. The flipflop input equations and circuit output equation are
  $J_A = Bx' + B'y$, $K_A = Bx' + y'$, $J_B = Ax'$, $K_B = A + xy'$, $z = Axy + Bx'y'$.

  ① Draw the logic diagram of the circuit.
  ② Tabulate the state table.
 ③ Derive the state equations for A and B.

Question 4

- (20 points) For the following state table

	Next State		Output	
Present State	$x = 0$	$x = 1$	$x = 0$	$x = 1$
a	f	b	0	0
b	d	c	0	0
c	f	e	0	0
d	g	a	1	0
e	d	c	0	0
f	f	b	1	1
g	g	h	0	1
h	g	a	1	0

❶ Draw the corresponding state diagram.
❷ Tabulate the reduced state table.
❸ Draw the state diagram corresponding to the reduced state table.
❹ Determine the output sequence for input sequence 01010010111 (from left to right) with the original state table and the reduced state table, starting from a.

Question 5

- (20 points) Obtain the simplified input equations for a sequential circuit that uses T flip-flops and is specified by the state diagram below.
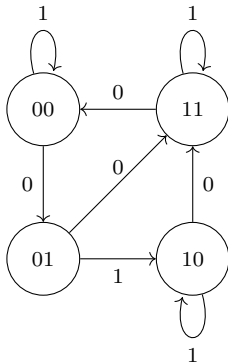
Hooray! There is no lab questions in this assignment!

It means that you'd better spend more time on your project, though.