ENG-2410 Assignment #6

School of Engineering, University of Guelph
Fall 2025

Start Date: Week #7, Due Date: Week #8 (Friday, 5:00 PM) in Dropbox

1. A sequential circuit with two D flip-flops A and B, two inputs X and Y, and one output Z is specified by the following input equations:
   $D_A = \bar{X}Y + XA$
   $D_B = \bar{X}B + XA$
   $Z = XB$

   (a) Draw the logic diagram of the circuit.

   (b) Derive the state table.

   (c) Derive the state diagram.

2. A sequential circuit has two JK flip-flops **A** and **B**, two inputs **X** and **Y**, and one output **Z**. The flip-flop input equations and output function are as follows:
   $J_A = BX + \bar{B}\bar{Y}$ $K_A = \bar{B}X\bar{Y}$ $Z = AXY + B\bar{X}\bar{Y}$
   $J_B = \bar{A}X$ $K_B = A + X\bar{Y}$

   (a) Draw the logic diagram of the circuit.

   (b) Derive the state table and state diagram of the circuit.

3. Figure 1 shows a sequential circuit with a J-K flip flop driven by combinational logic.

   (a) Derive the input equations for the J-K Flip Flop.

   (b) Derive the state table.

   (c) Derive the state diagram.

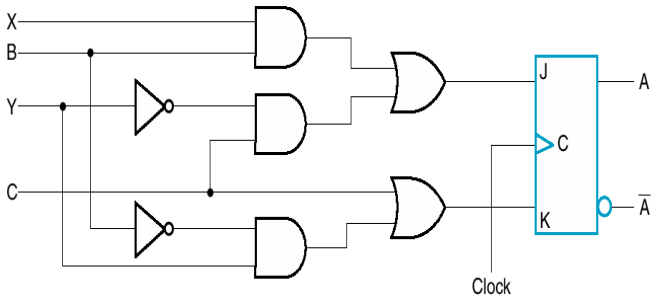

Figure 1: A Sequential Circuit using a J-K Flip-flop

Deliverable

- **Name your file** as follows: ENG2410_F25_Assignment6_LastNameFirstName.pdf
- **Write** your name, the course # and Term # on the first page of your submission (i.e solution).
- **Submit** a single PDF file of your solutions.
- **Upload** your PDF file in the Course Link dropbox.
- **Late** submissions are not accepted.
- Your solution of the assignment will **not be accepted** via email.
- To **receive 100% of the mark** you should attempt all questions.
- Solutions to the assignment will be posted at 5:30 PM on Fridays.
- If you have any questions related to the assignment, please **contact your Teaching Assistant** responsible for your Tutorial Section.
- Failing to follow the instructions above will lead to a ZERO grade!!