Digital Design Preliminary Exam

(Spring 2019)

Name and Student ID: _____

Name (Print Please)

Student ID

No Calculators allowed.

Simplify the following function, f= A'B'C'D+ A'B'CD' + ACD + ABC'D + AB'C'D using a K-map.

Design a sequential counter which counts the following sequence in the order listed: (0,1,4,5,7,0). The sequence starts at zero and ends at zero. Implement with a T-flip flop or D-flip flop. Specify the flip flop you will use. Note: Unused states are don't'care conditions.

- a. Illustrate the State Table
- b. Illustrate the State Diagram
- c. Draw the Sequential Circuit

Implement the following functions using a) Programmable Logic Array (PLA) and b) Programmable Array Logic (PAL). Illustrate the Programming Tables.

F1 = A'BC + A'BC' + AB'C

F2 = ABC + A'B'C'D'

Design a 4 to 1 multiplexer to implement the following function:

F(w,x,y) = w'x y' + wxy + wxy' + w'x'y'

Draw the multiplexer in block form.

a. Describe two types of clocking in a sequential circuit.

b. (1) Describe the difference between an asynchronous circuit and a synchronous circuit.

(2) Illustrate a timing diagram for each type of circuit using circuits of your creation.

a. Perform the following mathematical operation using 2's complement. Both numbers are unsigned.

01000101 - 00111011

b. Convert A45F in hexadecimal to: (1) binary.

(2) octal