Digital Design Preliminary Exam

(Spring 2020 Postponed Exam)

Problem 1	20 points
Problem 2	20 points
Problem 3	15 points
Problem 4	15 points
Problem 5	15 points
Problem 6	15 points
Total	100 points

Name and Student ID: ____

Name **(Print Please)** **Student ID**

No Calculators allowed.

Problem 1

Simplify the following function, f= A’B’C’ + A’B’C + ABC’ + AB’C’ using a K-map.

Problem 2

Design a sequential counter which counts the following sequence in the order listed: (0,2,4,5,7,0). The sequence starts at zero and ends at zero. Implement with a T-flip flop or D-flip flop. Specific the flip flop you will use.

a. Illustrate the State Table

b. Illustrate the State Diagram

c. Draw the Sequential Circuit

Problem 3

Implement the following functions using a) Programmable Logic Array (PLA) **or** optionally, b) Programmable Array Logic (PAL).

F1 = ABC + A’B’C’ + AB’C

F2= A’B’ + A’BC

Problem 4

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

$F(A,B,C) = A'B'C' + ABC + A'BC' + A'BC$

Illustrate the Truth Table and draw the multiplexer in block form.

Problem 5

Explain the differences between the RAM and ROM memory modules. Illustrate each the RAM and ROM using block models and label all inputs and outputs.

Problem 6

Perform the following mathematical operation using 2's complement. Illustrate all steps to perform the binary operation. Subsequently, convert the binary numbers to decimal and check your solution. Both numbers are unsigned.

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