

Digital Design Preliminary Exam (Fall 2013)

Problem 1 20 points

Problem 2 20 points

Problem 3 15 points

Problem 4 15 points

Problem 5 20 points

Problem 6 10 points

Total 100 points

Name or Student ID:

Date: 10/25/2013

Problem 1

Implement the following Boolean function using

- (a) **Multiplexer** and then implement with a
- (b) **Decoder** and finally, implement using
- (c) **Logic Gates.**

Label all devices, inputs and outputs.

$$F(W, X, Y, Z) = \sum (0, 1, 2, 3, 5, 6, 8, 9, 10, 12, 13)$$

Problem 2

Design a sequential counter which counts from 0 to 7 and then starts again at 0.

Note: Illustrate the **State Table**, **State Diagram** and **Sequential Circuit**

Implement with JK and T flip-flops.

Problem 4

Draw a PLA circuit to implement the functions

$$F_1 = AB' + A'C + AB'C'$$

$$F_2 = (A'B + AC + ABC)'$$