

**Department of Electrical and Computer Engineering
University of Wisconsin–Madison**

**ECE 553: Testing and Testable Design of Digital Systems
Fall 2011**

ASSIGNMENT #6

Date: Tuesday, Nov. 22, 2011

Due date: Thursday, Dec. 8, 2011

1. (Bushnell and Agrawal) Problem 9.11
2. Consider the following RAM test algorithm.

$\uparrow (W0) \uparrow (R0, W1, R1) \uparrow (R1, W0, R0)$

- (a) Which of the following two-coupling faults will be detected or not-detected by this test assuming that RAM contains 1M cells. Note we are interested in generalized two-coupling faults and if a coupling fault is not activated, that fault will clearly not be detected.

A change in the contents of cell 600 causes cell 10005 to change

A change in the cell content 30018 causes cell 0 to change

- (b) Identify all two-coupling faults from six different cases shown below that will not be detected by the above test algorithm.

- a \uparrow transition in i causes \uparrow transition in j

- a \uparrow transition in i causes \downarrow transition in j

- a \downarrow transition in i causes \uparrow transition in j

- a \downarrow transition in i causes \downarrow transition in j

- a \uparrow transition in i causes \updownarrow transition in j

- a \downarrow transition in i causes \updownarrow transition in j

3. (Bushnell and Agrawal) Problem 9.22
4. (Bushnell and Agrawal) Problem 13.1
5. (Bushnell and Agrawal) Problem 14.4
6. Consider the figure 14.16 in the the textbook. Draw the S-graph for the circuit and identify the flip-flop to be scanned so that all cycles are broken. Redraw the circuit with the scan circuitry and also draw the circuit that will be used by a test generator for the circuit with scan.