

Name: Key

Id#

COE 464, Term 042
Testing of Digital Circuits
Quiz# 1 (Practice)

Date: Tuesday, Feb. 22, 2005

Q1. Consider the two-input XOR gate $C = A \oplus B$.

- i. Determine all the **single stuck-at faults** in this gate. Are there equivalent faults?
- ii. Find all the possible test vectors that detect the fault **A stuck-at-0**.
- iii. Find a minimum complete detection test set for all the faults in this gate.
- iv. Find a minimum complete location test set for all the faults in this gate. Show the **fault dictionary**.



(ii) Test vectors that detect the fault A s-a-0 are:

$$C_{A_{s0}} \oplus C = B \oplus (A \oplus B) = A$$

$$\Rightarrow \{10, 11\}$$

(iii) & (iv)

A	B	C	A-s0	A-s1	B-s0	B-s1	C-s0	C-s1
0	0	0	0	1	0	1	0	1
0	1	1	1	0	0	1	0	1
1	0	1	0	1	1	0	0	1
1	1	0	1	0	1	0	0	1

fault dictionary {

It can be easily seen that any three vectors will form both a complete detection and locating test set. For example, $\{00, 01, 10\}$. Note that the faulty responses and the fault-free response are distinguishable from each other using this test set.