Q.4.5 (b) Typo - Test = {0011}

Correction – Test = {0111}

Q.4.8 (b) $Z_{1a0} = C'$ and $Z_{1c0} = C'$

$Z_{2a0} = ABC$ and $Z_{2c0} = AB$

$Z_{1ff} = C' + AB$ and $Z_{2ff} = AB + ABC = AB.(1 + C) = AB$

Test to distinguish a s-a-0 => $Z_{1ff}$ XOR $Z_{1a0} = 1$

⇨ $C' = 0$ and $AB = 1$

⇨ $ABC = 111$

=> $Z_{2ff}$ XOR $Z_{2a0} = 1$

=> ABC XOR AB = 1

=> ABC = 110

Test to distinguish c s-a-0 => $Z_{1ff}$ XOR $Z_{1c0} = 1$

⇨ $C' = 0$ and $AB = 1$

⇨ $ABC = 111$

=> $Z_{2ff}$ XOR $Z_{2c0} = 1$

⇨ AB XOR AB = 0

Test for a s-a-0 => {11X}

Test for c s-a-0 => {111}

Since tests exist for both the faults, both the faults are detectable.

For the faults to be distinguishable, there must exist a test vector which not only detects the faults( i.e gives output values different from fault free values) but also gives different outputs for each fault.

1. $Z_{1ff}$ XOR $Z_{1a0} = 1$
2. $Z_{2ff}$ XOR $Z_{2a0} = 1$
3. $Z_{1ff}$ XOR $Z_{1c0} = 1$
4. $Z_{2ff}$ XOR $Z_{2c0} = 1$
5. $Z_{1a0(111)}$ XOR $Z_{1c0(111)} = 1$

6. $Z_{2a0(111)}$ XOR $Z_{2c0(111)} = 1$

Since 111 is the common test vector, on evaluating the above equations with it, it is seen that 111 does not satisfy 5 and 6.

Therefore, the two faults are detectable but indistinguishable.