Name: Key   **Id#**

Q1. Consider the circuit given below and assume that you have all the single stuck-at faults in the circuit, without fault collapsing, to be fault simulated:
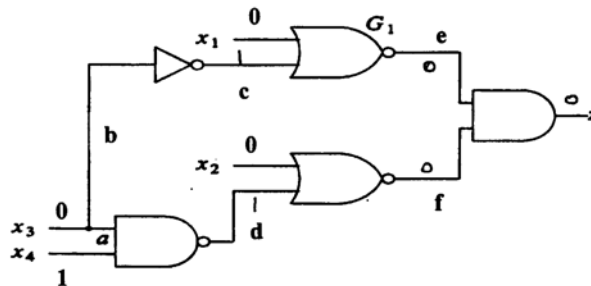
i. Using **Deductive fault simulation** technique, determine the set of faults detected by the test vector $x_1 x_2 x_3 x_4 = \{0001\}$.

$$L_{x1} = \{x1_1\} \quad , \quad L_{x2} = \{x2_1\} \quad , \quad L_{x3} = \{x3_1\} \quad , \quad L_{x4} = \{x4_0\}$$

$$L_a = L_{x3} \cup \{a_1\} = \{x3_1, a_1\} \quad , \quad L_b = L_{x3} \cup \{b_1\} = \{x3_1, b_1\}$$

$$L_c = L_b \cup \{c_0\} = \{x3_1, b_1, c_0\}$$

$$L_d = L_a - L_{x4} = \{x3_1, a_1\} - \{x4_0\} = \{x3_1, a_1\} \cup \{d_0\} = \{x3_1, a_1, d_0\}$$

$$L_e = \{L_c - L_{x1}\} \cup \{e_1\} = \{\{x3_1, b_1, c_0\} - \{x1_1\}\} \cup \{e_1\}$$
$$= \{x3_1, b_1, c_0, e_1\}$$

$$L_f = \{L_d - L_{x2}\} \cup \{f_1\} = \{\{x3_1, a_1, d_0\} - \{x2_1\}\} \cup \{f_1\}$$
$$= \{x3_1, a_1, d_0, f_1\}$$

$$L_z = \{L_e \cap L_f\} \cup \{z_1\} = \{x3_1, z_1\}$$

So, the faults detected are $x3$ s-a-1 and z s-a-1.