CS 220A — Computer Organization

Group No: 33 **Due Date:** January 24 2022, 23:59
Roll Number: 190616, 190714, 190773 **Assignment Number:** 1

Q4. The truth-table for the inputs is shown below:

Input (X)								Output (F)		
X_7	X_6	X_5	X_4	X_3	X_2	X_1	X_0	F_2	F_1	F_0
x	x	x	x	x	x	x	1	0	0	0
x	x	x	x	x	x	1	0	0	0	1
x	x	x	x	x	1	0	0	0	1	0
x	x	x	x	1	0	0	0	0	1	1
x	x	x	1	0	0	0	0	1	0	0
x	x	1	0	0	0	0	0	1	0	1
x	1	0	0	0	0	0	0	1	1	0
1	0	0	0	0	0	0	0	1	1	1

The expressions for F_0, F_1 and F_2 are described below:

$$F_0 = \overline{X_0 + \overline{X_0}\ \overline{X_1}\ X_2 + \overline{X_0}\ \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ X_4 + \overline{X_0}\ \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ \overline{X_4}\ \overline{X_5}\ X_6} \quad (1)$$

$$= \overline{X_0 + \overline{X_1}\ X_2 + \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ X_4 + \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ \overline{X_4}\ \overline{X_5}\ X_6} \quad (2)$$

$$= \overline{X_0 + \overline{X_1}\ X_2 + \overline{X_1}\ \overline{X_3}\ X_4 + \overline{X_1}\ \overline{X_3}\ \overline{X_5}\ X_6} \quad (3)$$

$$= \overline{X_0 + \overline{X_1}\ (X_2 + \overline{X_3}\ X_4 + \overline{X_3}\ \overline{X_5}\ X_6)} \quad (4)$$

$$F_1 = \overline{X_0 + \overline{X_0}\ X_1 + \overline{X_0}\ \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ X_4 + \overline{X_0}\ \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ \overline{X_4}\ X_5} \tag{5}$$

$$= \overline{X_0 + X_1 + \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ X_4 + \overline{X_1}\ \overline{X_2}\ \overline{X_3}\ \overline{X_4}\ X_5} \tag{6}$$

$$= \overline{X_0 + X_1 + \overline{X_2}\ \overline{X_3}\ X_4 + \overline{X_2}\ \overline{X_3}\ \overline{X_4}\ X_5} \tag{7}$$

$$= \overline{X_0 + X_1 + \overline{X_2}\ \overline{X_3}\ X_4 + \overline{X_2}\ \overline{X_3}\ X_5} \tag{8}$$

$$= \overline{X_0 + X_1 + \overline{X_2}\ \overline{X_3}\ (X_4 + X_5)} \tag{9}$$

$$\tag{10}$$

$$F_2 = \overline{X_0 + \overline{X_0}\ X_1 + \overline{X_0}\ \overline{X_1}\ X_2 + \overline{X_0}\ \overline{X_1}\ \overline{X_2}\ X_3} \tag{11}$$

$$= \overline{X_0 + X_1 + \overline{X_0}\ \overline{X_1}\ X_2 + \overline{X_0}\ \overline{X_1}\ \overline{X_2}\ X_3} \tag{12}$$

$$= \overline{X_0 + X_1 + X_2 + \overline{X_0}\ \overline{X_1}\ \overline{X_2}\ X_3} \tag{13}$$

$$= \overline{X_0 + X_1 + X_2 + X_3} \tag{14}$$