

7. (20 point) Sederhanakan fungsi logika berikut dengan menggunakan Aljabar Boole:

- $F_1 = \overline{A} \cdot \overline{B} \cdot C + A \cdot C + B \cdot C$
- $F_2 = A + \overline{A} \cdot C + B$
- $F_3 = \overline{A} + A \cdot B \cdot \overline{C} + \overline{A} + C$

$$A + AB = A + B$$

$$A + \overline{A}B = A + B$$

$$\overline{A} + AB = \overline{A} + B$$

$$F_1 = (\overline{A} \overline{B} C + AC) + BC$$

$$F_1 = (\overline{A} \overline{B} + A)C + BC$$

$$F_1 = (\overline{B} + A)C + BC$$

$$F_1 = (\overline{B} + A + B)C \rightarrow A + 1 = 1$$

$$F_1 = C$$

$$F_2 = \overline{A + \overline{A}C + B}$$

$$F_2 = \overline{A + \overline{A} + \overline{C} + B}$$

$$F_2 = \overline{B + \overline{C}} = \overline{B} \cdot \overline{\overline{C}}$$

$$F_2 = \overline{B}C$$

$$F_3 = (\overline{A} + A B \overline{C}) + \overline{A} + C$$

$$F_3 = \overline{A} + B \overline{C} + A \cdot \overline{C}$$

$$F_3 = \overline{A} + (B \overline{C} + \overline{C}) \rightarrow \overline{C}(B + 1) = \overline{C}$$

$$F_3 = \overline{A} + \overline{C}$$

Decimal	Biner	Oktal	Hexa
3821	^{2 3 5 5} 111011101101	7355	EEP
63	00111111	78 77	3F
1998			
			ADE
			FF7
2019			

$1 + 2^1 \cdot 0 + 2^2 \cdot 1 + 2^3 + 2^5 + 2^6 + 2^7$
 $2^9 + 2^{10} + 2^{11} = 3821$

0
1
2
3
4
5
6
7

	Pengurangan	Penjumlahan
Biner	$\begin{array}{r} 100010 \\ 1000100 - \\ \hline 0100010_2 (-) \end{array}$	$\begin{array}{r} 110010 \\ 11001 + \\ \hline 1001011 \end{array}$
Hexadesimal	$\begin{array}{r} A7 \\ 12 - \\ \hline 95 \end{array}$	$\begin{array}{r} 4A \\ 8F + \\ \hline D5 \end{array}$
Oktal	$\begin{array}{r} 559 \\ 35 - \\ \hline 27 \end{array} \quad \begin{array}{r} 70 \\ 31 - \\ \hline 37 \end{array}$	$\begin{array}{r} 71 \\ 287 + \\ \hline 120 \end{array}$
BCD	$\begin{array}{r} 0001\ 0010\ 0011\ 0010 \\ 0011\ 0101\ 0110 - \\ \hline 1110\ 1101\ 1100 \end{array}$	$\begin{array}{r} 0010\ 0001\ 0010 \\ 1000\ 1110\ 0011 + \\ \hline 1010\ 1110\ 1001 \end{array}$

0
1
2
3
4
5
6
7
8
9
A
B
C
D
E
F

$0100010 \rightarrow 34$
 $1000100 \rightarrow 68$
 \downarrow
 $0100010 \rightarrow 34$
 $0111011 \rightarrow -68$
 \downarrow
 $1011101 \rightarrow -34 (1)$

= $0100010_2 (-)$

Perhatikan tabel kebenaran berikut.

INPUT				OUT	
A	B	C	D	M	K
0	0	0	0	1	1
0	0	0	1	X	1
0	0	1	0	X	1
0	0	1	1	1	0
0	1	0	0	1	X
0	1	0	1	0	X
0	1	1	0	1	1
0	1	1	1	X	0
1	0	0	0	X	1
1	0	0	1	1	1
1	0	1	0	1	0
1	0	1	1	0	0
1	1	0	0	1	0
1	1	0	1	X	0
1	1	1	0	0	X
1	1	1	1	0	X

a). Gambar Kmap M dan K

b). Tulis persamaan kanonikal SOP M dan K

c). Tentukan persamaan logika paling sederhana melalui Kmap dari M dan K

0	1	3	2
4	5	7	6
12	13	15	14
8	9	11	10

0	1	3	2
4	5	7	6

M

AB \ CD	00	01	11	10
00	1	X	1	X
01	1	0	X	1
11	1	X	0	0
10	X	1	0	1

$$M = \bar{B}\bar{D} + A\bar{C} + \bar{A}C + \bar{A}\bar{D}$$

$$M = (\bar{A} + B)D + (A + \bar{C})$$

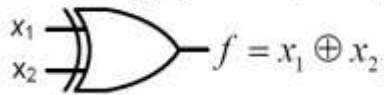
K

AB \ CD	00	01	11	10
00	1	1	0	1
01	X	X	0	1
11	0	0	X	X
10	1	1	0	0

$$K = \bar{B}\bar{C} + \bar{A}\bar{D}$$

$$K = (C + D)(A + B)(A + C)$$

3. (10 point) Berikut adalah gerbang logika XOR, gambarkan rangkaian logika yang ekuivalen dengan menggunakan ~~HANYA~~ gerbang logika NAND (tidak diperkenankan menggunakan gerbang logika selain NAND)



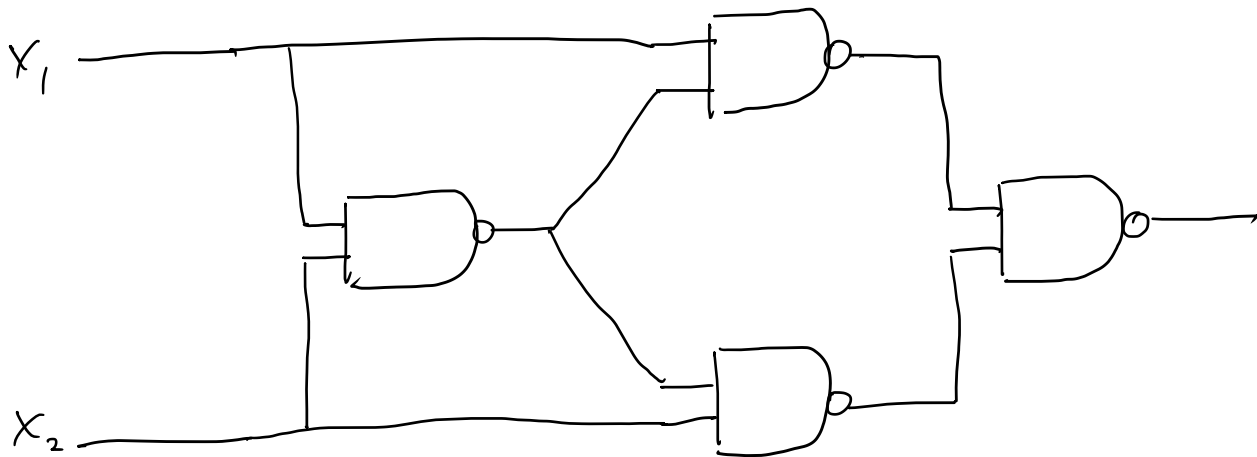
$$\overline{x_1} \cdot x_2 + x_1 \cdot \overline{x_2}$$

$$\overline{\overline{1} \cdot \overline{0}} = \overline{0} = 1$$

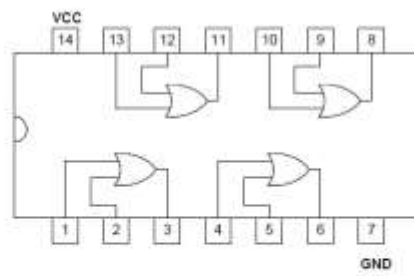
XOR

NAND

x_1	x_2	f	x_1	x_2	f
0	0	0	0	0	1
0	1	1	0	1	1
1	0	1	1	0	1
1	1	0	1	1	0



6. (5 point) Berikut adalah gambar skematik IC TTL 74LS32 (OR):



Lengkapi tabel dibawah ini berdasarkan konfigurasi pin input/output IC diatas:

PIN I/O	1	2	3	4	5	6	7	8	9	10	11	12	13	14
LOGIKA	0	0	0	1	1	1	0	1	0	1	1	1	0	1