

**ITI1500**  
**Devoir # 4**  
**SOLUTIONS**

4.1

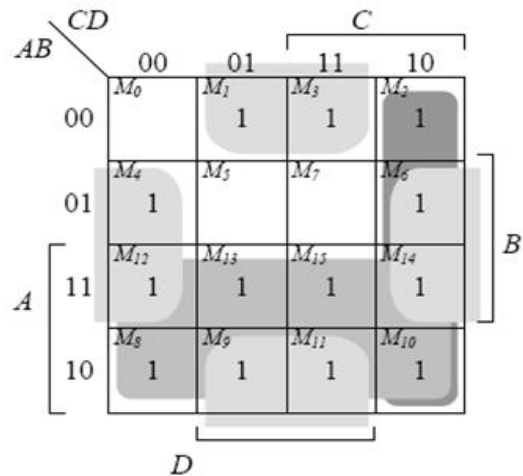
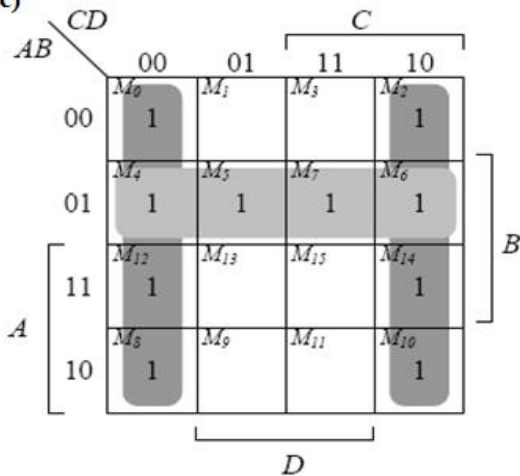
(a)  $T_1 = B'C, T_2 = A'B, T_3 = A + T_1 = A + B'C,$   
 $T_4 = D \oplus T_2 = D \oplus (A'B) = A'BD' + D(A + B') = A'BD' + AD + B'D$   
 $F_1 = T_3 + T_4 = A + B'C + A'BD' + AD + B'D$   
 With  $A + AD = A$  and  $A + A'BD' = A + BD'$ :  
 $F_1 = A + B'C + BD' + B'D$   
 Alternative cover:  $F_1 = A + CD' + BD' + B'D$

$$F_2 = T_2 + D' = A'B + D'$$

(b)

<i>ABCD</i>	<i>T</i> <sub>1</sub>	<i>T</i> <sub>2</sub>	<i>T</i> <sub>3</sub>	<i>T</i> <sub>4</sub>	<i>F</i> <sub>1</sub>	<i>F</i> <sub>2</sub>
0000	0	0	0	0	0	1
0001	0	0	0	1	1	0
0010	1	0	1	0	1	1
0011	1	0	1	1	1	0
0100	0	1	0	1	1	1
0101	0	1	0	0	0	1
0110	0	1	0	1	1	1
0111	0	1	0	0	0	1
1000	0	0	1	0	1	1
1001	0	0	1	1	1	0
1010	1	0	1	0	1	1
1011	1	0	1	1	1	0
1100	0	0	1	0	1	1
1101	0	0	1	1	1	0
1110	0	0	1	0	1	1
1111	0	0	1	1	1	0

(c)



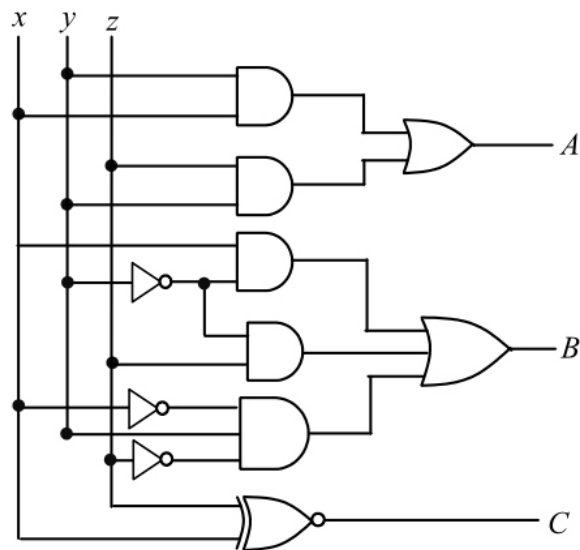
$x$	$y$	$z$	$A$	$B$	$C$
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	1	1
0	1	1	1	0	0
1	0	0	0	1	0
1	0	1	0	1	1
1	1	0	1	0	0
1	1	1	1	0	1

$$\begin{aligned}
 A &= x'y'z + xy'z' + xyz \\
 &= x'y'z + xy(z' + z) \\
 &= x'y'z + xy(1) \\
 A &= y(x'z + x)
 \end{aligned}$$

$$\begin{aligned}
 A &= y(x' + x)(z + x) \\
 &= y(1)(z + x) \\
 A &= xy + yz
 \end{aligned}$$

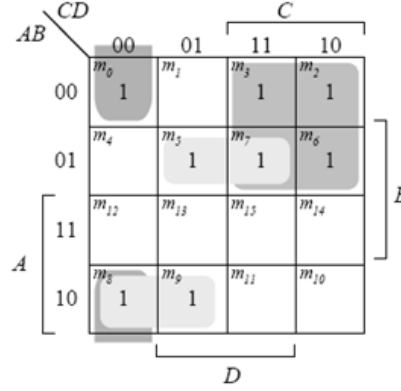
$$\begin{aligned}
 B &= x'y'z + x'yz' + xy'z' + xy'z \\
 &= x'y'z + x'yz' + xy'z' + xy'z + xy'z \\
 &= (x' + x)y'z + x'yz' + xy'(z' + z) \\
 &= (1)y'z + x'yz' + xy'(1) \\
 B &= xy' + y'z + x'yz'
 \end{aligned}$$

$$\begin{aligned}
 C &= x'y'z' + x'yz' + xy'z + xyz \\
 &= x'z'(y' + y) + xz(y' + y) \\
 &= x'z'(1) + xz(1) \\
 &= x'z' + xz \\
 C &= (x \oplus z)'
 \end{aligned}$$



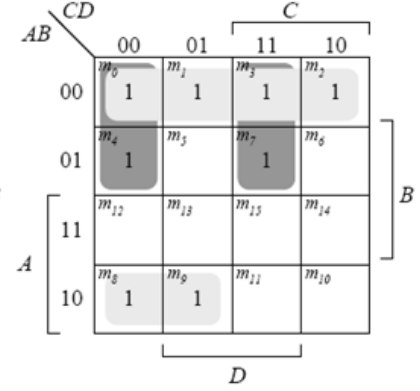
4.9

<i>ABCD</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>
0000	1	1	1	1	1	1	0
0001	0	1	1	0	0	0	0
0010	1	1	0	1	1	0	1
0011	1	1	1	1	0	0	1
0100	0	1	1	0	0	1	1
0101	1	0	1	1	0	1	1
0110	1	0	1	1	1	1	1
0111	1	1	1	0	0	0	0
1000	1	1	1	1	1	1	1
1001	1	1	1	1	0	1	1

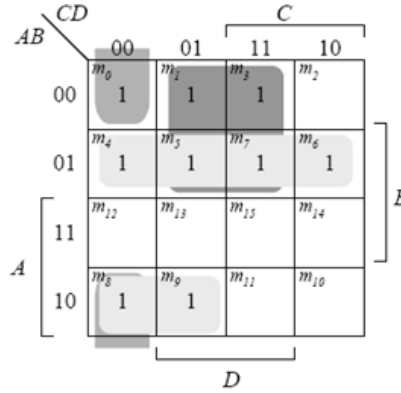


$$a = A'C + A'BD + AB'C' + A'B'D'$$

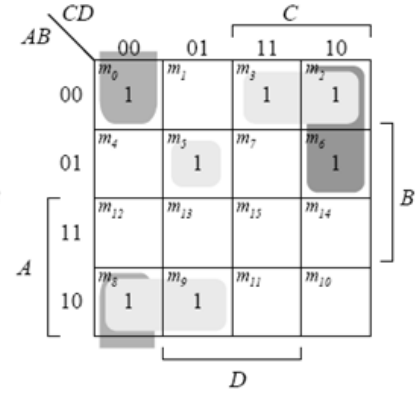
$$a = A'C + A'BD + B'C'D' + AB'C'$$



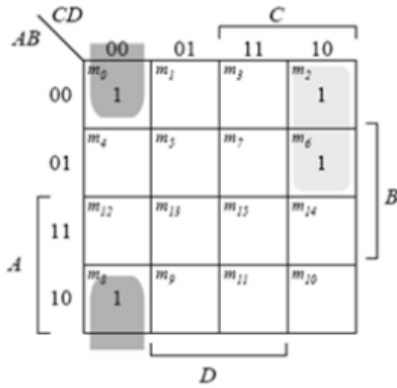
$$b = A'B' + B'C' + A'CD' + A'CD$$



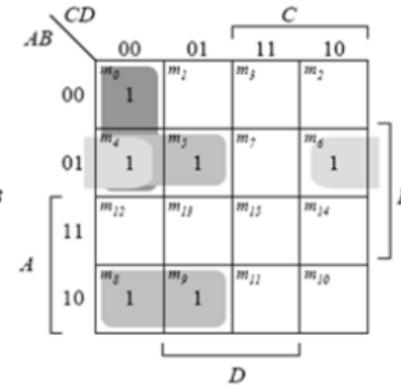
$$c = A'B + A'D + B'C'$$



$$d = A'CD' + A'B'C + B'C'D' + AB'C' + A'BC'D$$

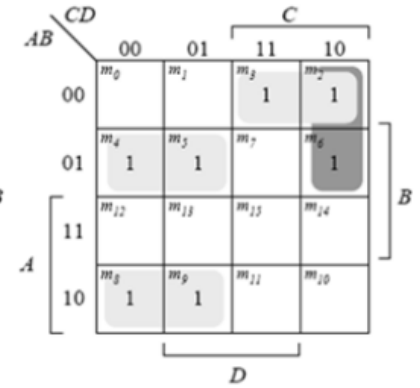


$$e = A'CD' + B'C'D'$$



$$f = A'BC' + A'C'D' + A'BD + AB'C'$$

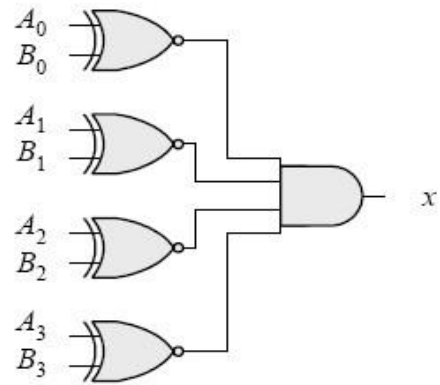
$$\text{or } f = A'BC' + AB'C' + A'BD + B'C'D'$$



$$g = A'CD' + A'B'C + A'BC' + AB'C'$$

$$\text{or } g = A'BC' + AB'C' + A'B'C + A'BD'$$

4.21



$$x = (A \oplus B)'$$

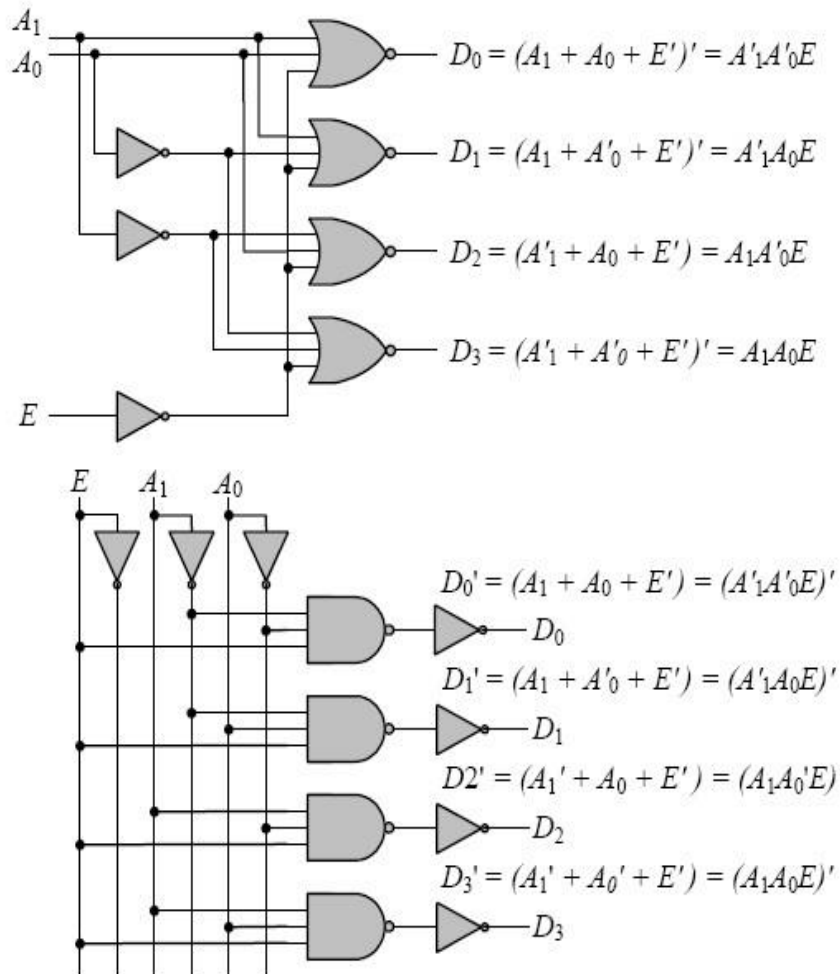
$A$	$B$	$x$
0	0	1
0	1	0
1	0	0
1	1	1

$$x = (A_0 \oplus B_0)'(A_1 \oplus B_1)'(A_2 \oplus B_2)'(A_3 \oplus B_3)'$$

4.23

$$\begin{aligned} D_0 &= A_1'A_0'E = (A_1 + A_0 + E')' \text{ [NOR]} \\ D_1 &= A_1'A_0E = (A_1 + A_0' + E')' \text{ [NOR]} \\ D_2 &= A_1A_0'E = (A_1' + A_0 + E')' \text{ [NOR]} \\ D_3 &= A_1A_0E = (A_1' + A_0' + E')' \text{ [NOR]} \end{aligned}$$

$$\begin{aligned} D_0' &= (A_1'A_0'E)' \text{ [NAND]} \\ D_1' &= (A_1'A_0E)' \text{ [NAND]} \\ D_2' &= (A_1A_0'E)' \text{ [NAND]} \\ D_3' &= (A_1A_0E)' \text{ [NAND]} \end{aligned}$$

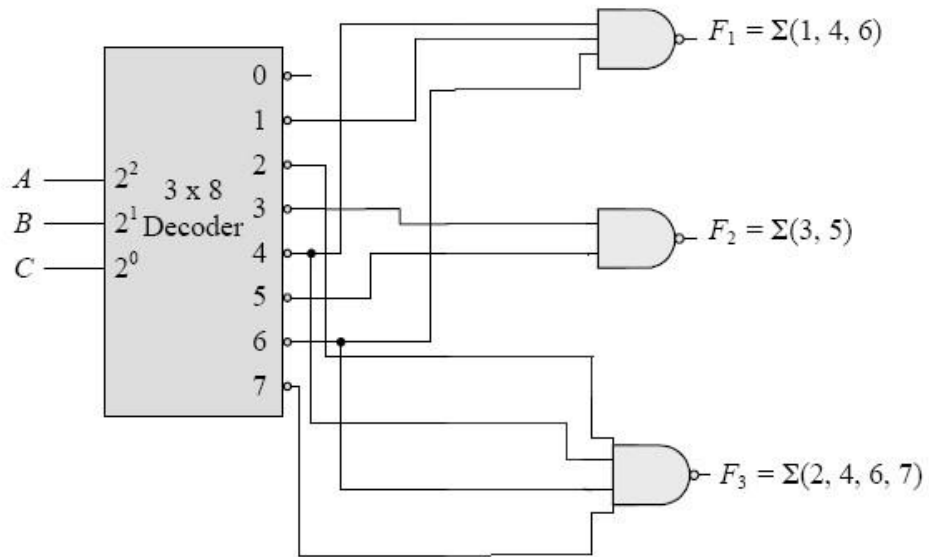


4.27

$$F_1(A,B,C) = \sum(1,4,6) = A'B'C + AB'C' + ABC' = (A'B'C)'(AB'C')'(ABC')'$$

$$F_2(A,B,C) = \sum(3,5) = A'BC + AB'C = ((A'BC)'(AB'C))'$$

$$F_3(A,B,C) = \sum(2,4,6,7) = A'BC' + AB'C' + ABC' + ABC = ((A'BC')'(AB'C')'(ABC')'(ABC))'$$



4.28

a)

$$F_1(x, y, z) = x'yz' + xz$$

$$= x'yz' + xz(y + y')$$

$$= x'yz' + xy'z + xyz$$

$$= m_2 + m_5 + m_7$$

$$F_1(x, y, z) = \sum(2, 5, 7)$$

$$F_2(x, y, z) = xy'z' + x'y$$

$$= xy'z' + x'y(z + z')$$

$$= xy'z' + x'yz' + x'yz$$

$$= m_4 + m_2 + m_3$$

$$F_2(x, y, z) = \sum(2, 3, 4)$$

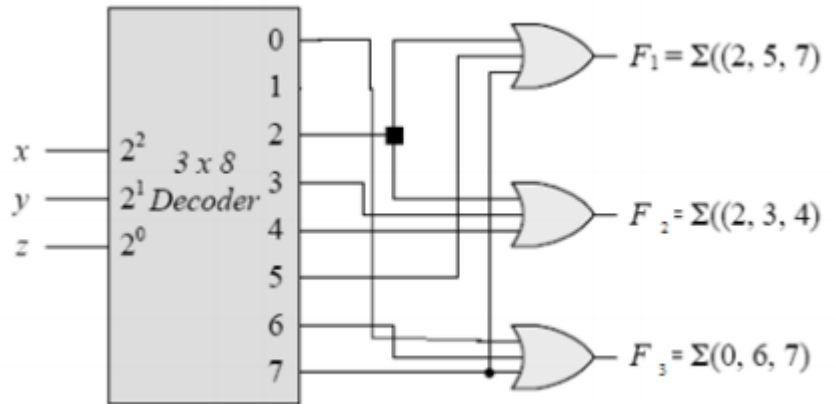
$$F_3(x, y, z) = x'y'z' + xy$$

$$= x'y'z' + xy(z + z')$$

$$= x'y'z' + xyz' + xyz$$

$$= m_0 + m_6 + m_7$$

$$F_3(x, y, z) = \sum(0, 6, 7)$$



b)

$$F_1(x, y, z) = (y' + x)z$$

$$= y'z + xz$$

$$= (x + x')y'z + x(y + y')z$$

$$= xy'z + x'y'z + xyz + xy'z$$

$$= m_5 + m_1 + m_7 + m_5$$

$$F_1(x, y, z) = \sum(1, 5, 7)$$

$$F_2(x, y, z) = y'z' + x'y + yz'$$

$$= (x + x')y'z' + x'y(z + z') + (x + x')yz'$$

$$= xy'z' + x'y'z' + x'yz' + x'yz' + xyz' + x'yz'$$

$$= m_4 + m_0 + m_3 + m_2 + m_3 + m_2$$

$$F_2(x, y, z) = \sum(0, 2, 3, 4, 6)$$

$$F_3(x, y, z) = (x + y)z$$

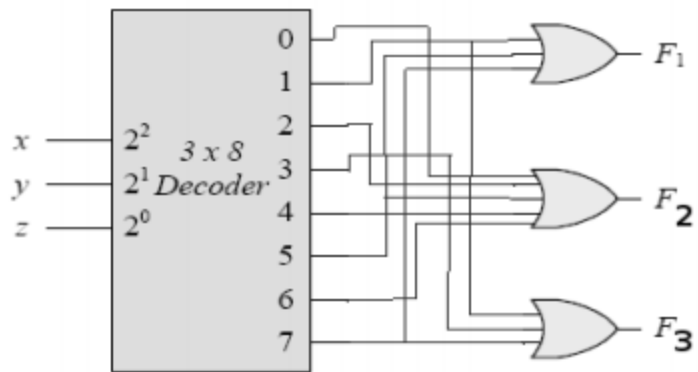
$$= xz + yz$$

$$= x(y + y')z + (x + x')yz$$

$$= xyz + xy'z + xyz + x'yz$$

$$= m_7 + m_5 + m_7 + m_3$$

$$F_3(x, y, z) = \sum(3, 5, 7)$$



4.33

Cette question est  
retirée