

**ITI1500A**  
**Devoir # 3**  
**SOLUTIONS**

**3.2**

		y			
		00	01	11	10
x	0	$m_0$ 1	$m_1$ 1	$m_3$	$m_2$
	1	$m_4$	$m_5$ 1	$m_7$ 1	$m_6$

(a)  $F = x'y' + xz$

		y			
		00	01	11	10
x	0	$m_0$	$m_1$ 1	$m_3$ 1	$m_2$ 1
	1	$m_4$	$m_5$	$m_7$ 1	$m_6$ 1

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

		y			
		00	01	11	10
x	0	$m_0$	$m_1$	$m_3$ 1	$m_2$ 1
	1	$m_4$ 1	$m_5$ 1	$m_7$	$m_6$

(c)  $F = xy' + x'y$

		y			
		00	01	11	10
x	0	$m_0$	$m_1$ 1	$m_3$ 1	$m_2$ 1
	1	$m_4$	$m_5$ 1	$m_7$ 1	$m_6$ 1

(d)  $F = y + z$

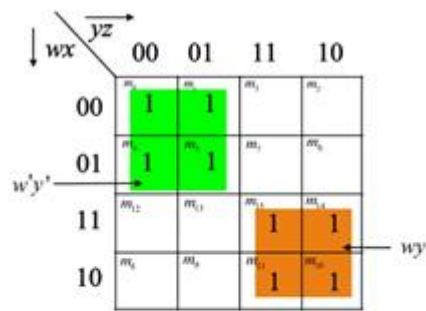
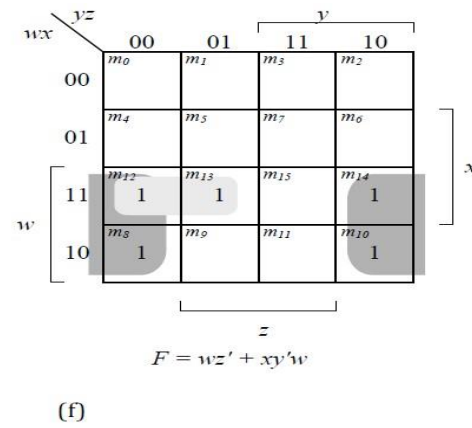
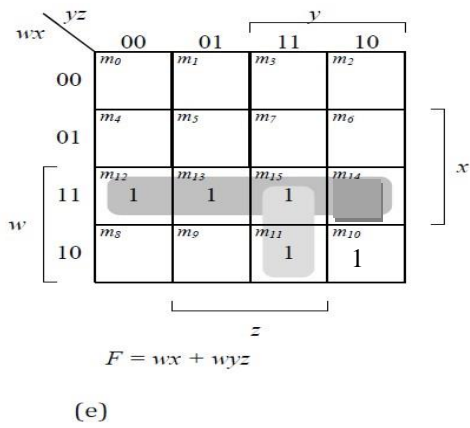
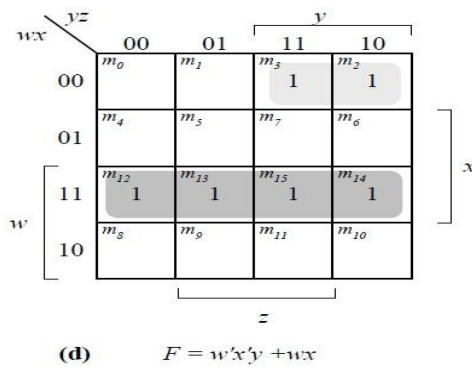
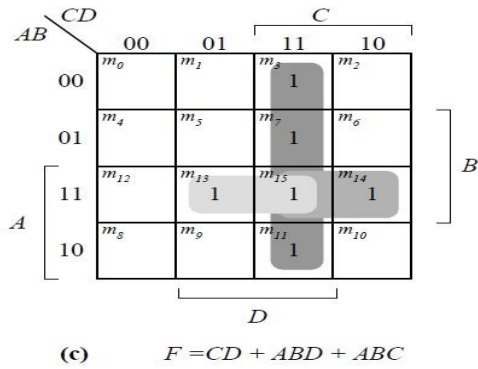
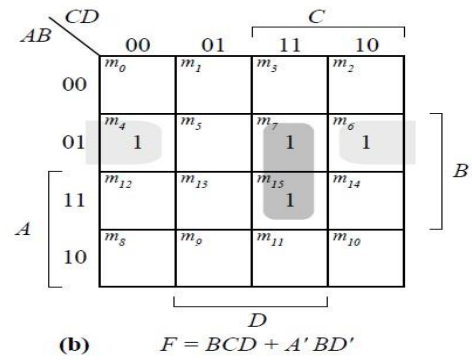
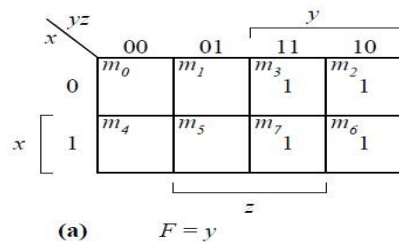
		y			
		00	01	11	10
x	0	$m_0$ 1	$m_1$	$m_3$	$m_2$ 1
	1	$m_4$ 1	$m_5$	$m_7$	$m_6$ 1

(e)  $F = z'$

		y			
		00	01	11	10
x	0	$m_0$	$m_1$	$m_3$ 1	$m_2$
	1	$m_4$ 1	$m_5$ 1	$m_7$ 1	$m_6$ 1

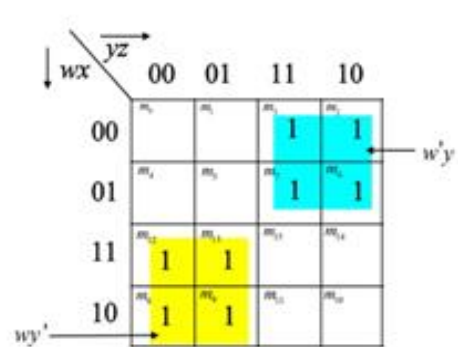
(f)  $F = x + yz$

### 3.4



$$F(w, x, y, z) = wy + w'y'$$

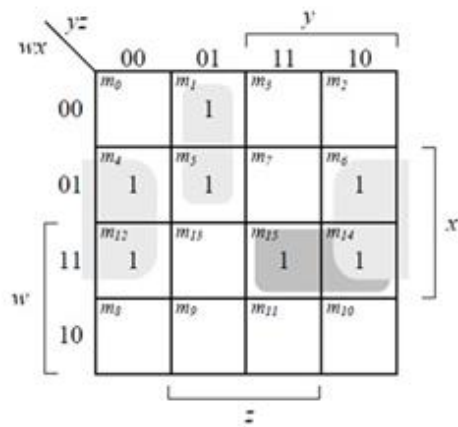
g0



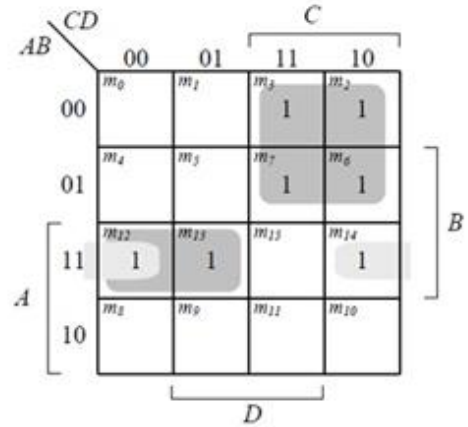
$$F(w, x, y, z) = w'y + wy'$$

h0

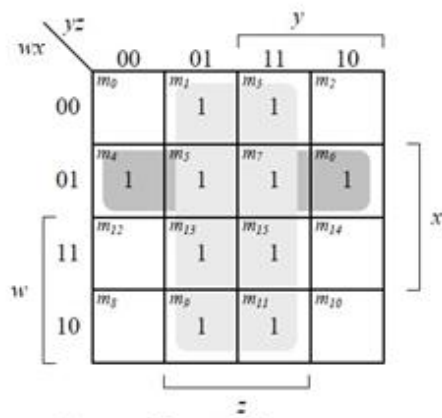
### 3.5



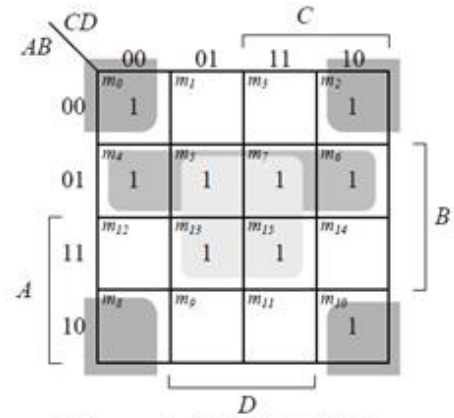
(a)  $F = xz' + w'y'z + wxy$



(b)  $F = A'C + ABC' + ABD'$

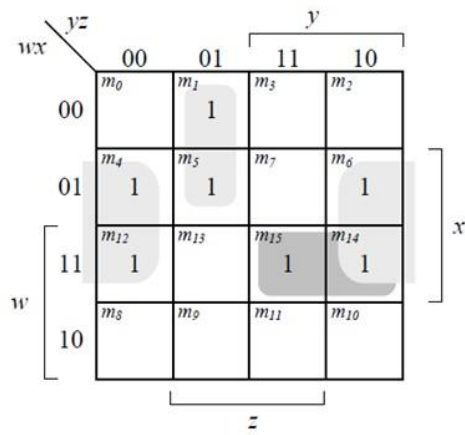


(c)  $F = z + xw'$

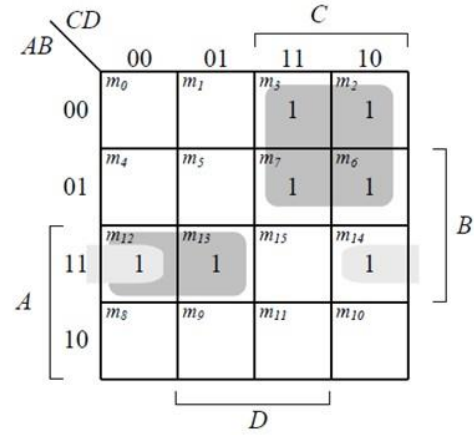


(d)  $F = BD + A'B + B'D'$   
or  $F = BD + B'D' + A'D'$

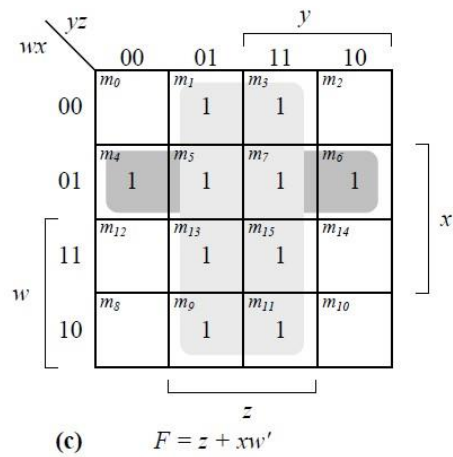
### 3.6



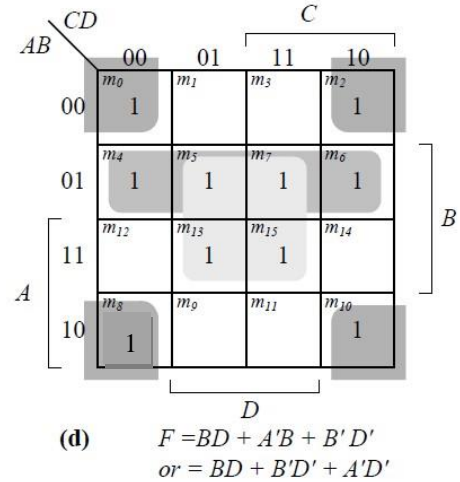
(a)  $F = xz' + w'y'z + wx'y$



(b)  $F = A'C + ABC' + ABD'$



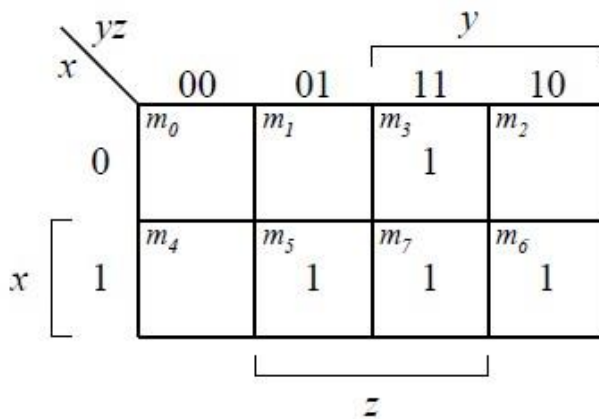
(c)  $F = z + xw'$



(d)  $F = BD + A'B + B'D'$   
or  $F = BD + B'D' + A'D'$

### 3.8

(a)  $F(x, y, z) = \Sigma(3, 5, 6, 7)$



(b)  $F = \Sigma(1, 3, 5, 9, 12, 13, 14)$

$AB \backslash CD$		$C$			
		00	01	11	10
$A$	00	$m_0$	$m_1$ 1	$m_3$ 1	$m_2$
	01	$m_4$	$m_5$ 1	$m_7$	$m_6$
	11	$m_{12}$ 1	$m_{13}$ 1	$m_{15}$	$m_{14}$ 1
	10	$m_8$	$m_9$ 1	$m_{11}$	$m_{10}$

$D$

$B$

(c)  $F = \Sigma(0, 1, 2, 3, 11, 12, 14, 15)$

$wx \backslash yz$		$y$			
		00	01	11	10
$w$	00	$m_0$ 1	$m_1$ 1	$m_3$ 1	$m_2$ 1
	01	$m_4$	$m_5$	$m_7$	$m_6$
	11	$m_{12}$ 1	$m_{13}$	$m_{15}$ 1	$m_{14}$ 1
	10	$m_8$	$m_9$	$m_{11}$ 1	$m_{10}$

$z$

$x$

(d)  $F = \Sigma(3, 4, 5, 6, 7, 11, 12)$

AB \ CD		C			
		00	01	11	10
A	00	$m_0$	$m_1$	$m_3$ 1	$m_2$
	01	$m_4$ 1	$m_5$ 1	$m_7$ 1	$m_6$ 1
	11	$m_{12}$ 1	$m_{13}$	$m_{15}$	$m_{14}$
	10	$m_8$	$m_9$	$m_{11}$ 1	$m_{10}$

D

### 3.10

wx \ yz		y			
		00	01	11	10
w	00	$m_0$ 1	$m_1$	$m_3$	$m_2$ 1
	01	$m_4$	$m_5$ 1	$m_7$ 1	$m_6$
	11	$m_{12}$ 1	$m_{13}$ 1	$m_{15}$ 1	$m_{14}$ 1
	10	$m_8$ 1	$m_9$	$m_{11}$	$m_{10}$ 1

z

$F = \Sigma(0, 2, 5, 7, 8, 10, 12, 13, 14, 15)$

**Essential:**  $xz, x'z'$

$F = xz + x'z' + wx$  or

$F = xz + x'z' + wz'$

(a)

AB \ CD		C			
		00	01	11	10
A	00	$m_0$ 1	$m_1$	$m_3$ 1	$m_2$ 1
	01	$m_4$	$m_5$ 1	$m_7$ 1	$m_6$
	11	$m_{12}$	$m_{13}$	$m_{15}$ 1	$m_{14}$ 1
	10	$m_8$ 1	$m_9$	$m_{11}$ 1	$m_{10}$ 1

D

$F = \Sigma(0, 2, 3, 5, 7, 8, 10, 11, 14, 15)$

**Essential:**  $AC, B'D', A'BD$

$F = AC + B'D' + A'BD + CD$  or

$F = AC + B'D' + A'BD + B'C$

(b)

Note: dans le cours:

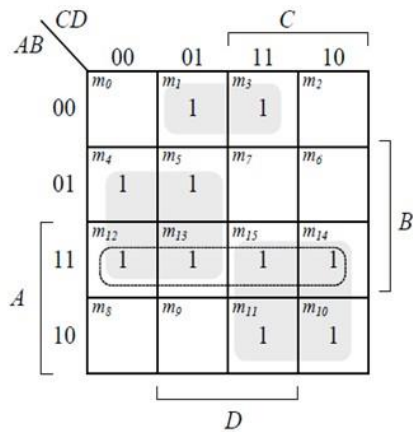
Essential:  $wx, x'z', xz$  (groupeage actuel)

ou  $wz', x'z', xz$  (groupeage différent)

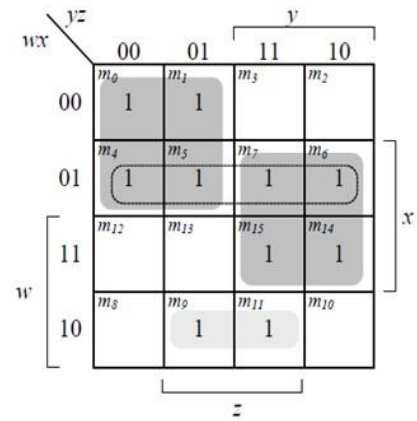
Essentiel:  $AC, B'D', A'BD, AC$  (groupeage actuel)

ou  $AC, B'D', A'BD, B'C$  (groupeage différent)

Seuls les essentiels font parties de la fonction simplifiée selon du groupeage choisi

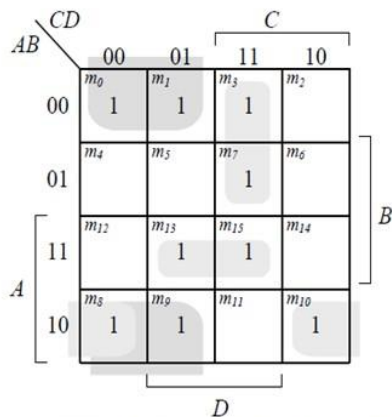


(c)

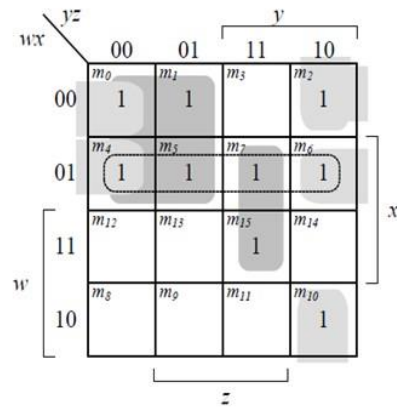


(d)

Même principe que pour (a) et (b)



(e)



(f)

Même principe que pour (a) et (b)

### 3.15

		$y$			
		$00$	$01$	$11$	$10$
$x$	$0$	$m_0$ 1	$m_1$ 1	$m_3$ X	$m_2$ X
	$1$	$m_4$ 1	$m_5$ 1	$m_7$ X	$m_6$ 1

$$F = 1$$

$$F = \Sigma(0, 1, 2, 3, 4, 5, 6, 7)$$

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

$$F = B'D' + CD' + ABC'D$$

$$F = \Sigma(0, 2, 6, 8, 10, 13, 14)$$

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

$$F = BC + ABD' + A'BD$$

$$F = \Sigma(5, 6, 7, 12, 14, 15)$$

AB	CD			
	00	01	11	10
00	$m_0$ X	$m_1$	$m_3$	$m_2$ 1
01	$m_4$ 1	$m_5$	$m_7$ 1	$m_6$ X
11	$m_{12}$ 1	$m_{13}$	$m_{15}$	$m_{14}$
10	$m_8$ X	$m_9$	$m_{11}$	$m_{10}$ 1

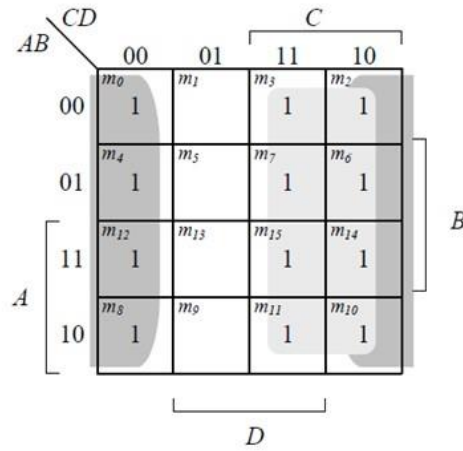
$$F = B'D' + C'D' + A'BC$$

$$F = \Sigma(0, 2, 4, 6, 7, 8, 10, 12)$$



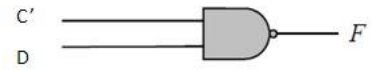
### 3.16

(a)

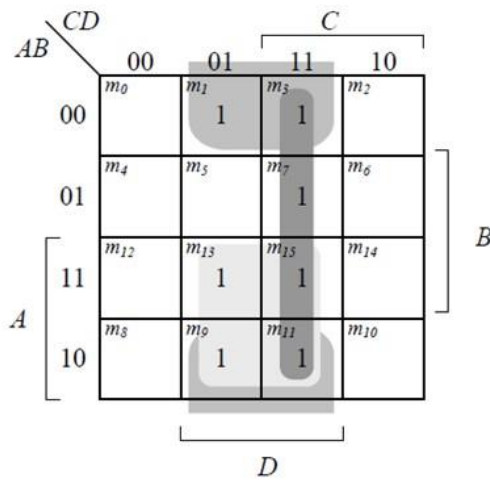


$$F = C + D'$$

$$F = (C'D)'$$

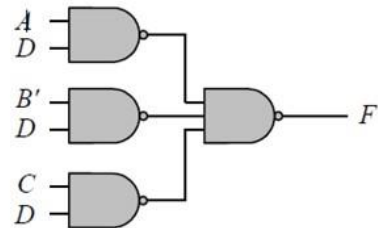


(b)

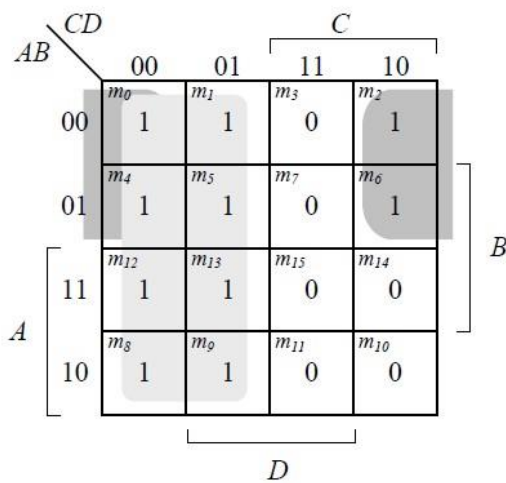


$$F = AD + B'D + CD$$

$$F = ((AD)' (B'D)' (CD)')'$$



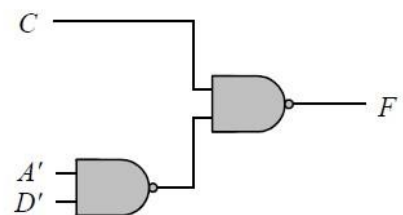
(c)  $F = (A' + C' + D')(A' + C')(C' + D')$   
 $F' = (A' + C' + D')' + (A' + C')' + (C' + D')'$   
 $F' = ACD + AC + CD$



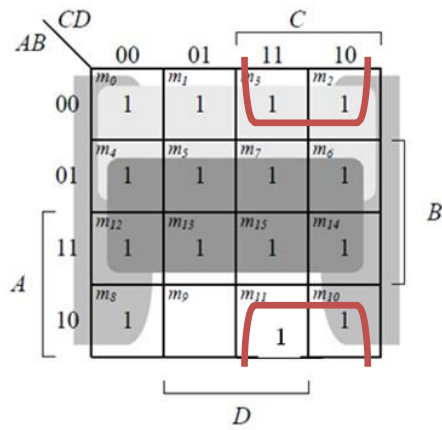
$$F = C' + A'D'$$

$$F = (C(A + D))'$$

$$F = (C(A'D'))'$$

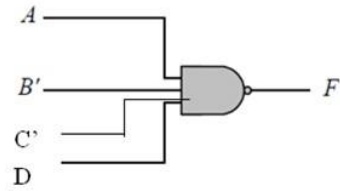


(d)



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

$$F = (A(B')(C')D)'$$



3.18

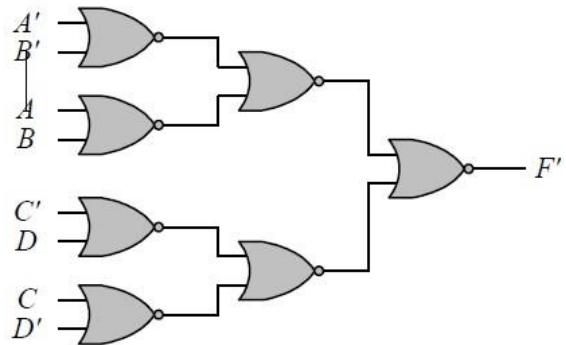
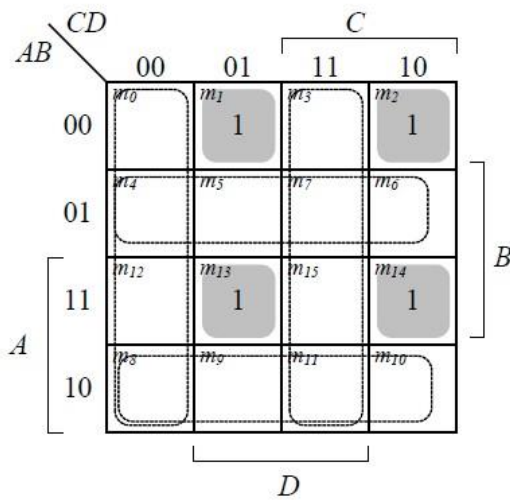
a-

$$F = (A \oplus B)'(C \oplus D) = (AB' + A'B)'(CD' + C'D)$$

$$= (AB + A'B')(CD' + C'D) = ABCD' + ABC'D + A'B'CD' + A'B'C'D$$

$$F' = (AB + A'B')' + (CD' + C'D)'$$

$$F' = ((A' + B')' + (A + B)')' + ((C' + D)' + (C + D)')'$$



**b-**

$$F = (AB + A'B')(C'D + CD')$$

$$F = ((AB + A'B'))' ((C'D + CD'))'$$

$$F = ((AB)' \cdot (A'B')')' ((C'D)' \cdot (CD')')'$$

$$F' = (((AB)' \cdot (A'B')')' ((C'D)' \cdot (CD')')')'$$

