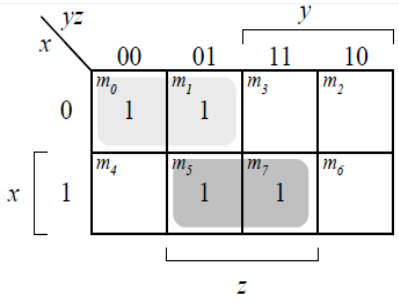
ITI1100C

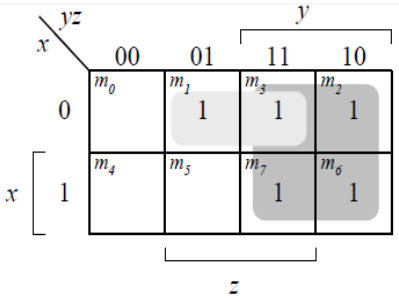
Assignment # 3

SOLUTIONS

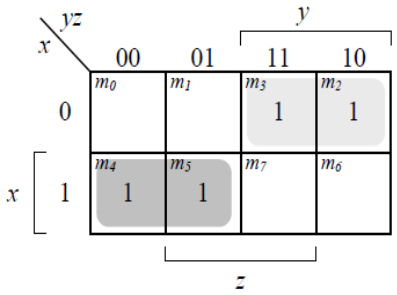
3.2



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

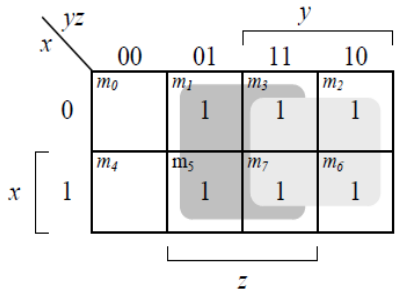


(b) $F = y + x'z$



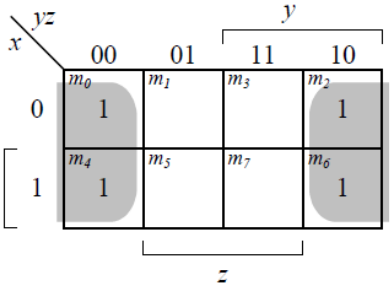
$F = xy' + x'y$

(c)



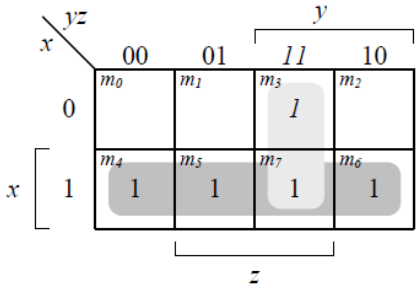
$F = y + z$

(d)



$F = z'$

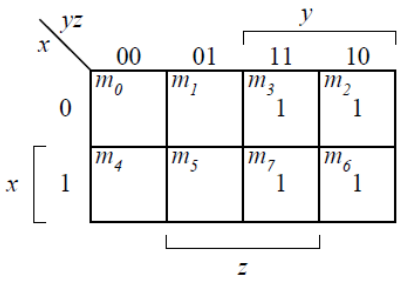
(e)



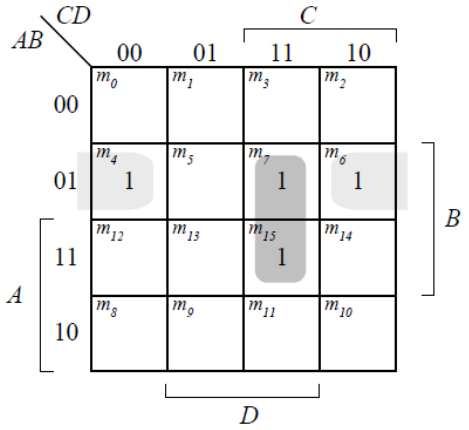
$F = x + y\,z$

(f)

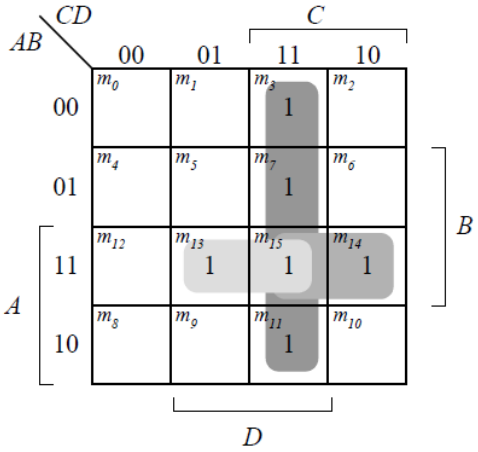
3.4



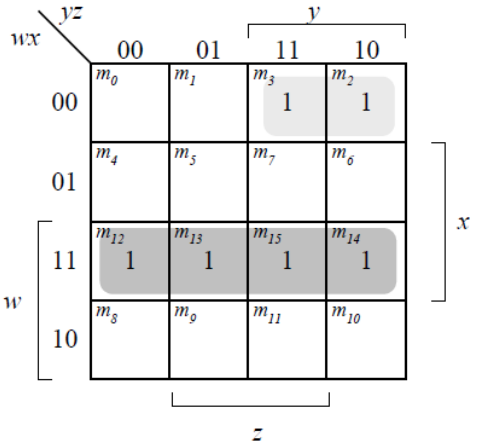
(a) $F = y$



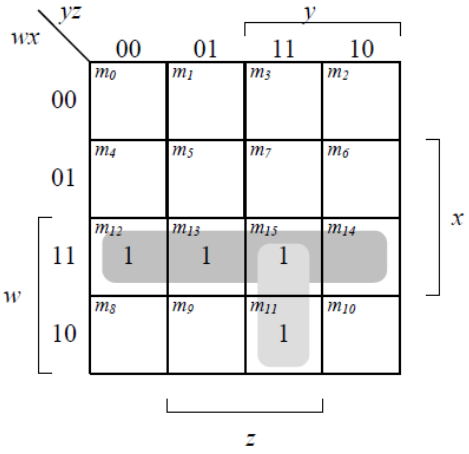
(b) $F = BCD + A'BD'$



(c) $F = CD + ABD + ABC$

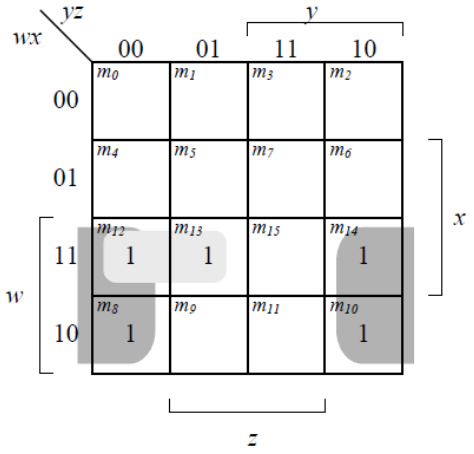


(d) $F = w'x'y + wx$



$F = wx + wyz$

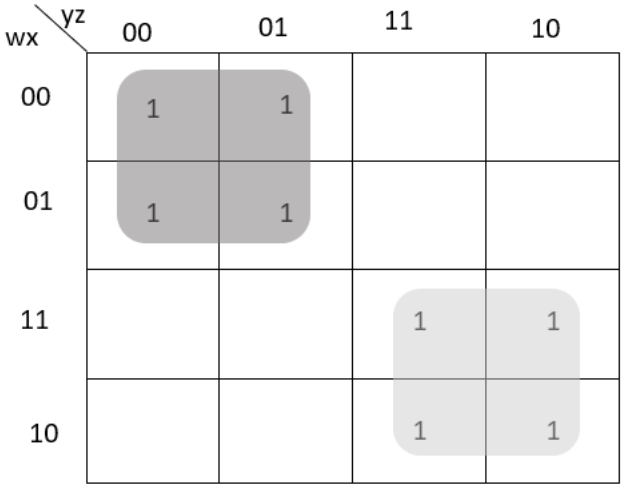
(e)



$F = wz' + xy'w$

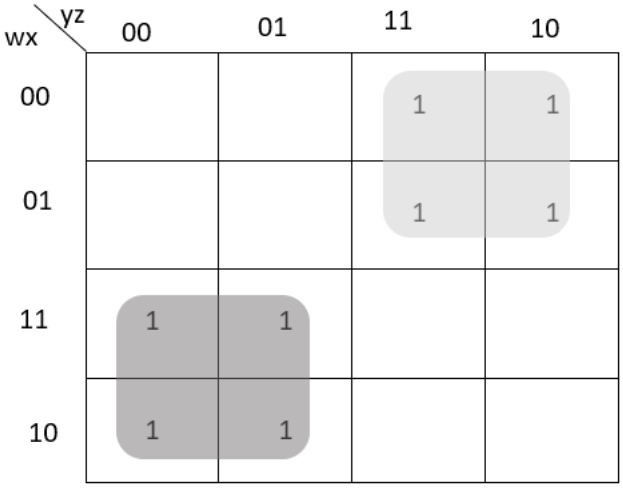
(f)

3.4 (g)



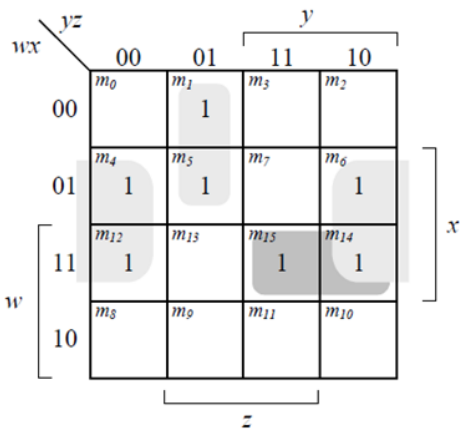
$F = w'y' + wy$

3.4 (h)

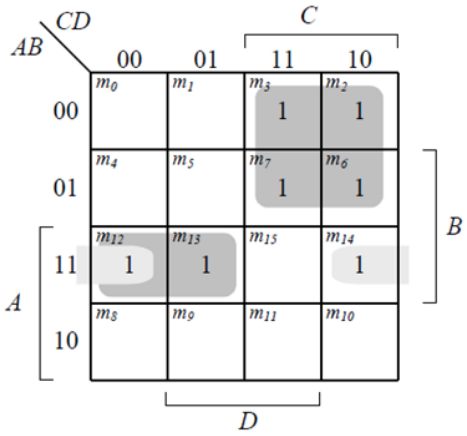


$F = wy' + w'y$

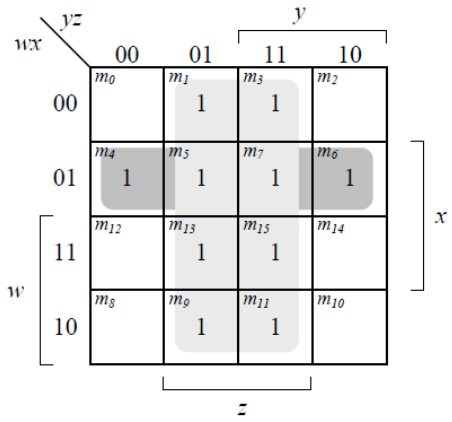
3.5



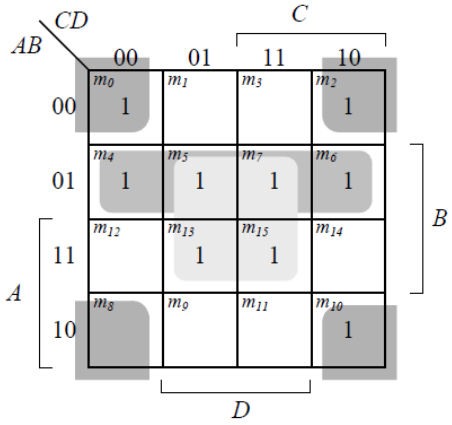
(a) $F = xz' + w'y'z + wxy$



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



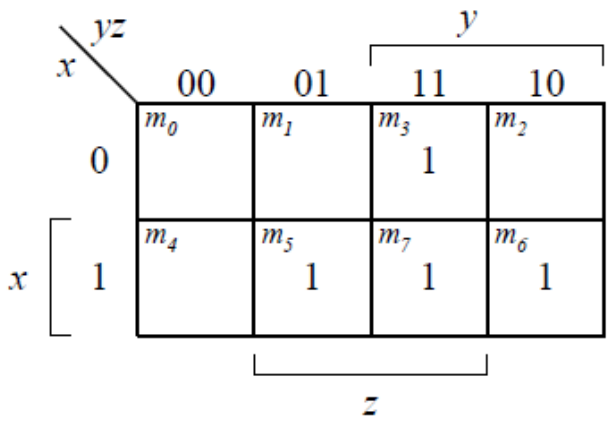
(c) $F = z + xw'$



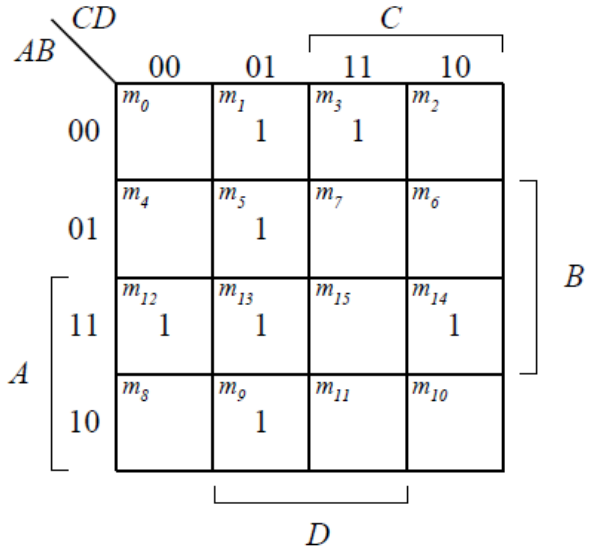
(d) $F = BD + A'B + B'D'$
$or = BD + B'D' + A'D'$

3.8

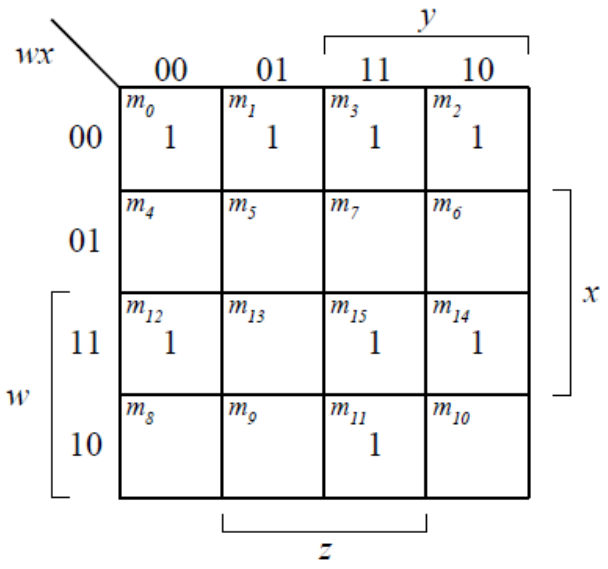
(a) $F(x, y, z) = \Sigma(3, 5, 6, 7)$



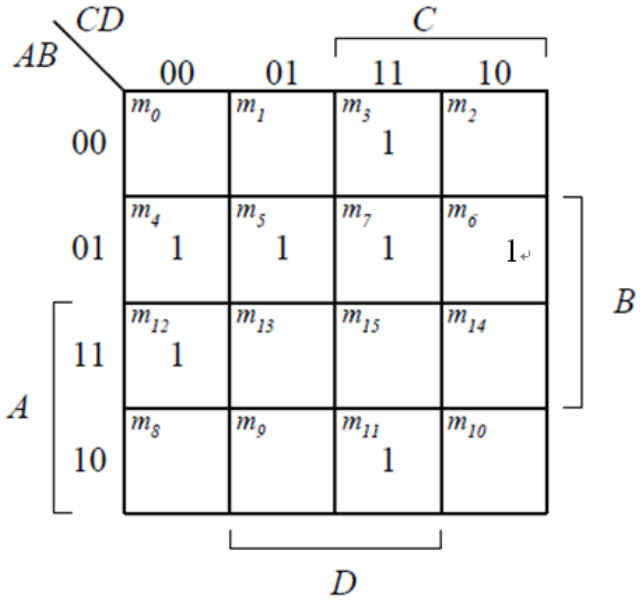
(b) $F = \Sigma(1, 3, 5, 9, 12, 13, 14)$



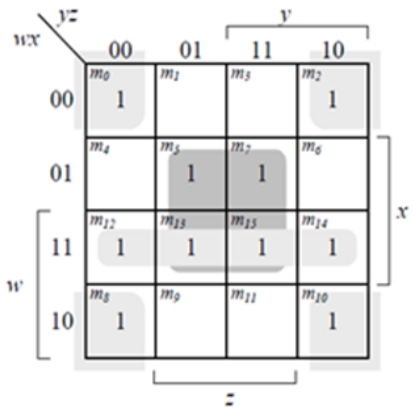
(c) $F = \Sigma(0, 1, 2, 3, 11, 12, 14, 15)$



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



3.10



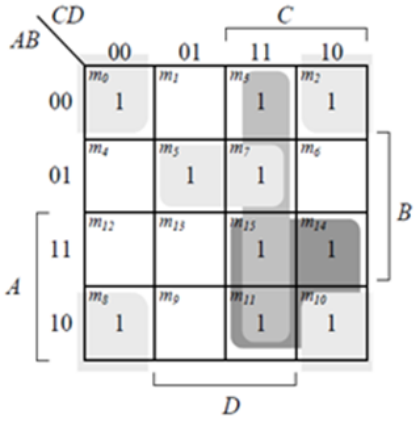
$F = \Sigma(0, 2, 5, 7, 8, 10, 12, 13, 14, 15)$

Essential: xz, x'z'

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

F=xz+x'z'+wz'

(a)



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

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

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

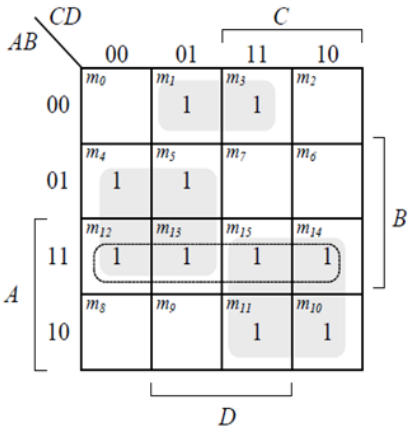
F= AC+B'D'+A'BD+B'C

(b)

Note: From the course notes: Essential: AC, B'D', A'BD, AC (current grouping) or AC, B'D', A'BD, B'C (different Grouping)

Essential: wx, x'z', xz (current grouping) or wz', x'z', xz (different grouping)

Only essentials are listed in the function (depending the selected grouping)

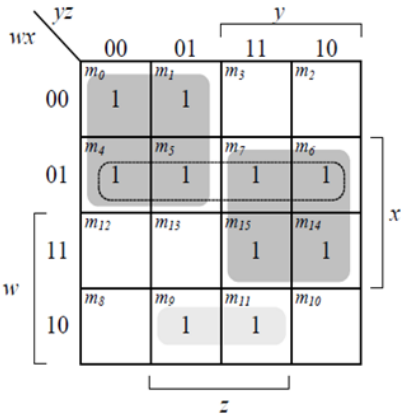


F = Σ(1, 3, 4, 5, 10, 11, 12, 13, 14, 15)

Essential: AC, BC'

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

(c)



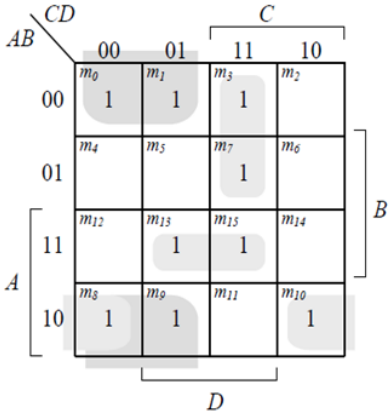
F = Σ(0, 1, 4, 5, 6, 7, 9, 11, 14, 15)

Essential: w'y', xy

$F = w'y' + xy + wx'z$

(d)

Use the same approach as for 3.10

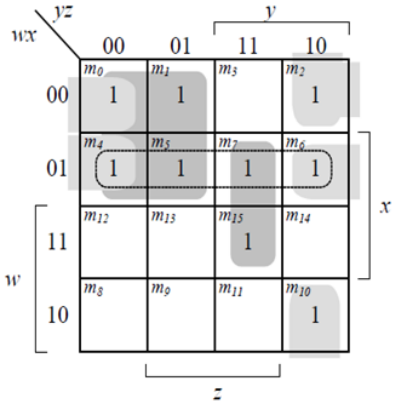


F(A, B, C, D) = S(0, 1, 3, 7 8, 9, 10,13,15)

Essential: *B'C'. AB'D'*

F=B'C'+AB'D'+A'CD+ABD

(e)



F = S(0, 1, 2, 4, 5, 6, 7, 10, 15)

Essential: w'y', xyz, x'yz'

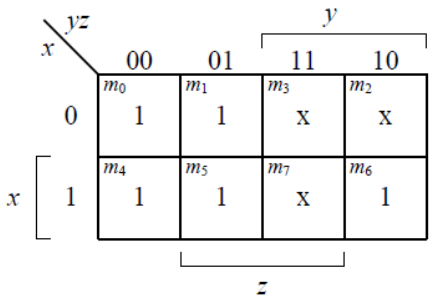
F=w'y'+xyz+x'yz'+w'z' **or**

F= w'y'+xyz+x'yz'+w'x

(f)

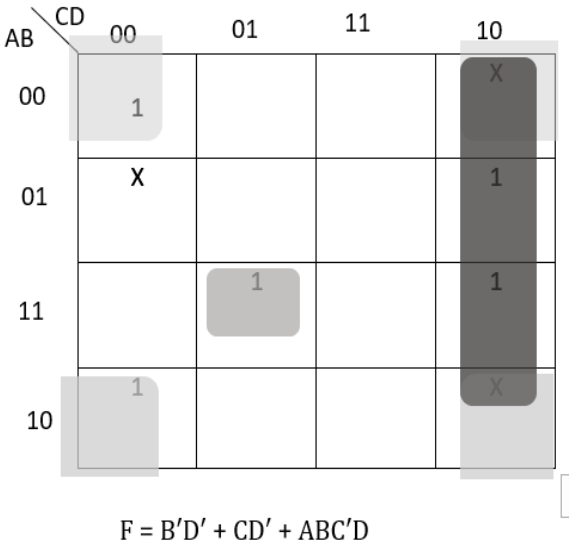
Use the same approach as for 3.10

3.15



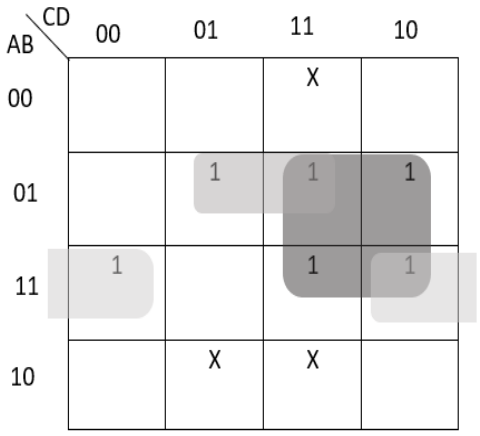
$F = 1$

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



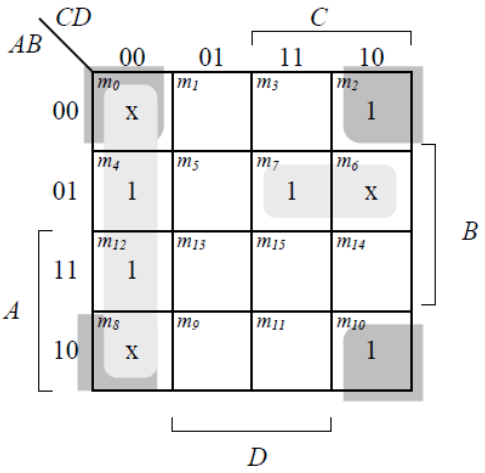
F = B′D′ + CD′ + ABC′D

F = Σ (0, 2, 6, 8,10, 13, 14)



F = BC + ABD′ + A′BD

F = Σ (5, 6, 7, 12, 14, 15)

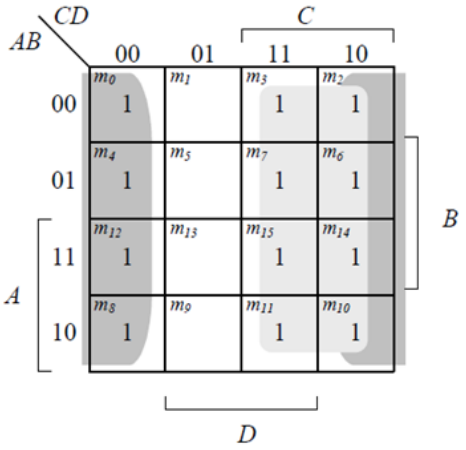


$F = B'D' + C'D' + A'BC$

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

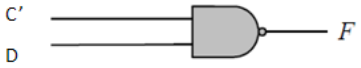
3.16

(a)

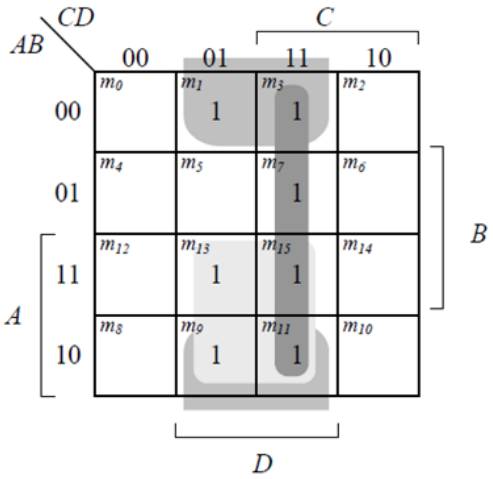


$F = C + D'$

$F = (C'D)'$

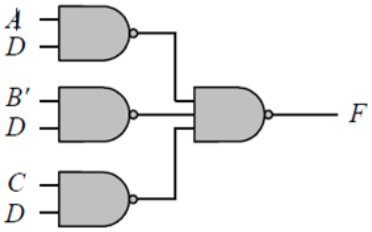


(b)



$F = AD + B'D + CD$

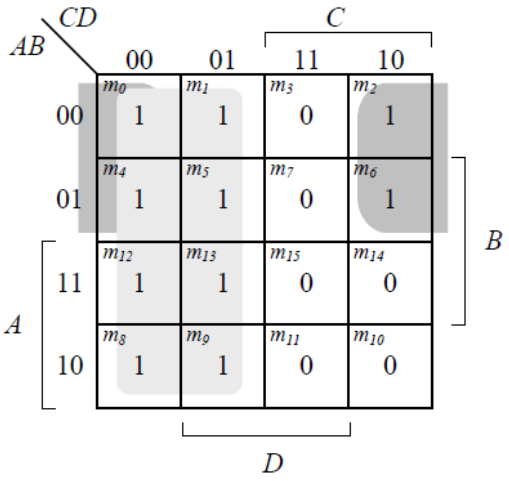
$F = ((AD)'(B'D)'(CD)')'$



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

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

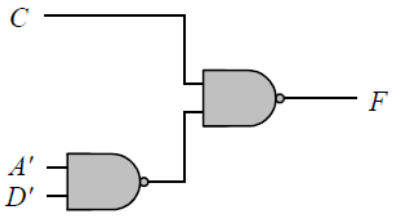
$F' = ACD + AC + CD$



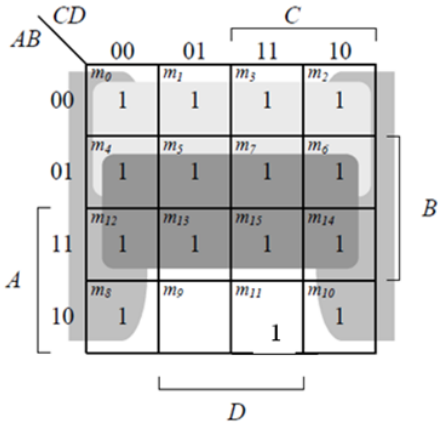
$F = C' + A'D'$

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

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

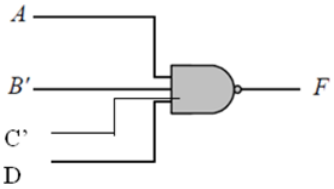


(d)



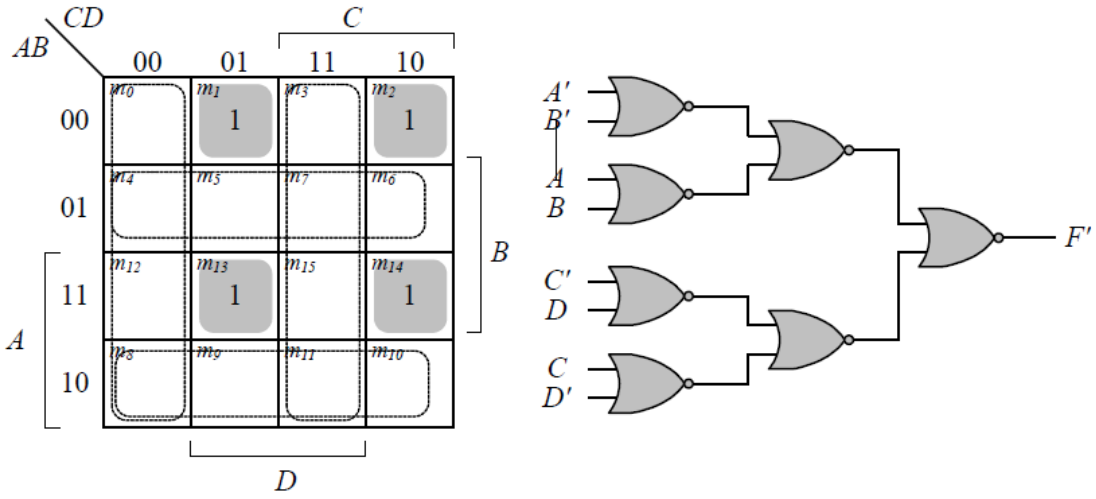
F=A'+B+C+D'

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



3.18

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



(b)

F = (AB + A′B′) (C′D + CD′)

F = ((AB + A′B′)′)′ ((C′D + CD′)′)′

F = ((AB) ′ . (A′B′)′)′ ((C′D) ′ . (CD′)′)′

F′ = (((AB) ′ . (A′B′)′)′ ((C′D) ′ . (CD′)′)′) ′