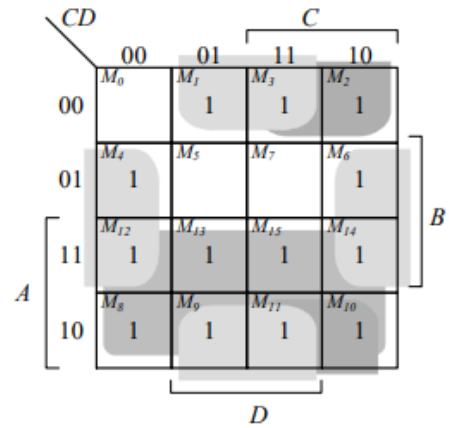


4.1

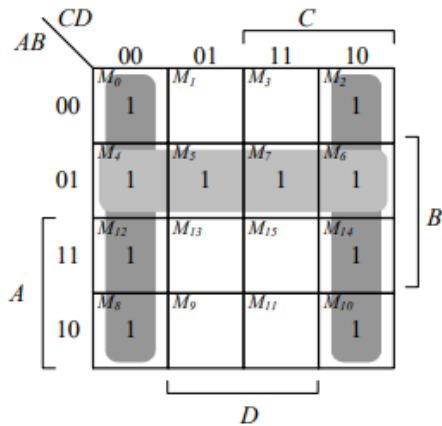
- (a) $T_1 = B'C, T_2 = A'B, T_3 = A + T_1 = A + B'C,$
 $T_4 = D \oplus T_2 = D \oplus (A'B) = A'BD' + D(A + B') = A'BD' + AD + B'D$
 $F_1 = T_3 + T_4 = A + B'C + A'BD' + AD + B'D$
 With $A + AD = A$ and $A + A'BD' = A + BD'$:
 $F_1 = A + B'C + BD' + B'D$
 Alternative cover: $F_1 = A + CD' + BD' + B'D$

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

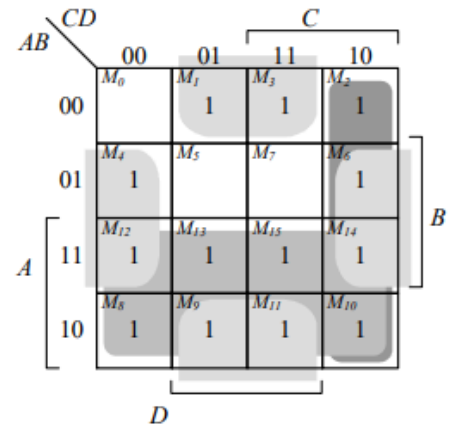
ABCD	T_1	T_2	T_3	T_4	F_1	F_2
0000	0	0	0	0	0	1
0001	0	0	0	1	1	0
0010	1	0	1	0	1	1
0011	1	0	1	1	1	0
0100	0	1	0	1	1	1
0101	0	1	0	0	0	1
0110	0	1	0	1	1	1
0111	0	1	0	0	0	1
1000	0	0	1	0	1	1
1001	0	0	1	1	1	0
1010	1	0	1	0	1	1
1011	1	0	1	1	1	0
1100	0	0	1	0	1	1
1101	0	0	1	1	1	0
1110	0	0	1	0	1	1
1111	0	0	1	1	1	0



$$F_1 = A + B'C + B'D + BD'$$



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



$$F_1 = A + CD' + B'D + BD'$$

4.4 (a) $F(A, B, C) = \Sigma(0, 1, 2, 7)$

$A \backslash BC$	00	01	11	10
	1	1	0	1
$A'C'$	0	0	1	0
	$A'B'$		ABC	

Simplified SOP form:

$$\begin{aligned}
 F(A, B, C) &= A'C' + A'B' + ABC \\
 &= A'(B' + C') + ABC \\
 &= A'(BC)' + ABC \\
 &= \underline{A \text{ XNOR } (BC)}
 \end{aligned}$$

$$= A \oplus (BC)$$



4.8

Decimal Digit	8, 4, -2, -1 code				BCD Code			
	<i>w</i>	<i>x</i>	<i>y</i>	<i>z</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
0	0	0	0	0	0	0	0	0
1	0	1	1	1	0	0	0	1
2	0	1	1	0	0	0	1	0
3	0	1	0	1	0	0	1	1
4	0	1	0	0	0	1	0	0
5	1	0	1	1	0	1	0	1
6	1	0	1	0	0	1	1	0
7	1	0	0	1	0	1	1	1
8	1	0	0	0	1	0	0	0
9	1	1	1	1	1	0	0	1

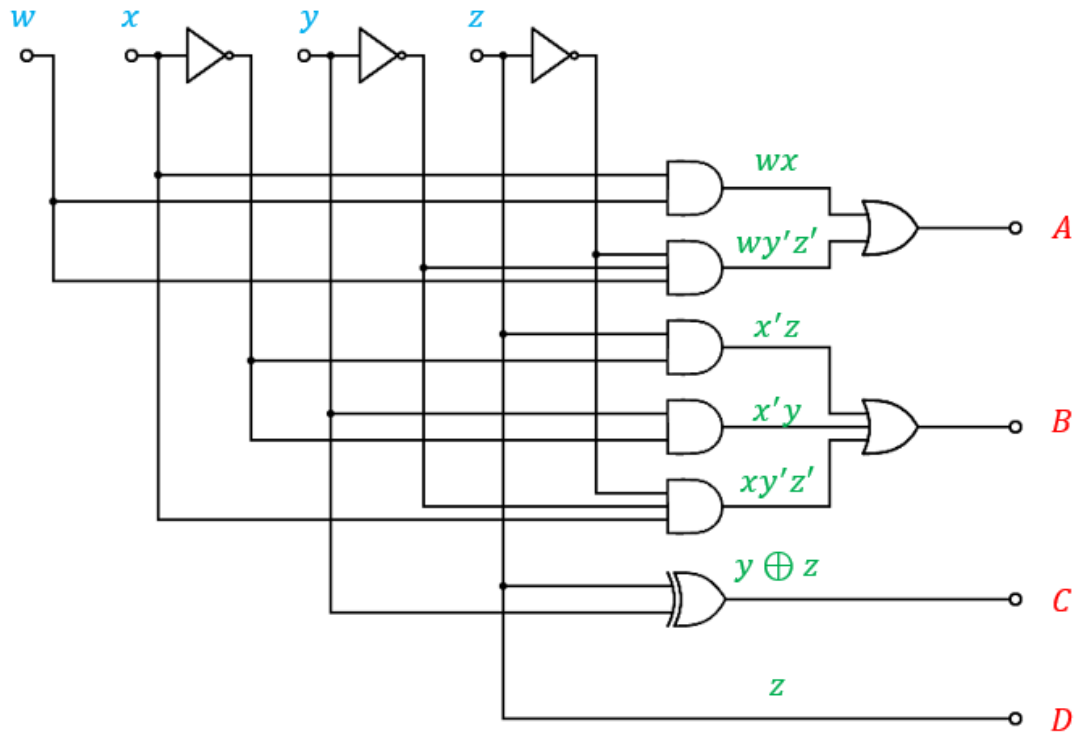
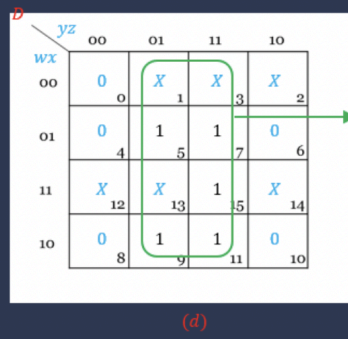
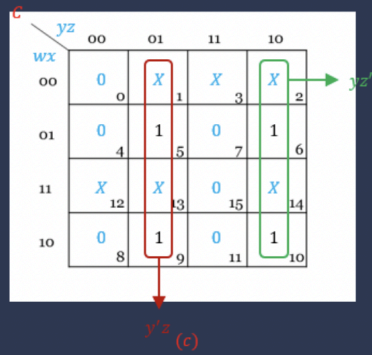
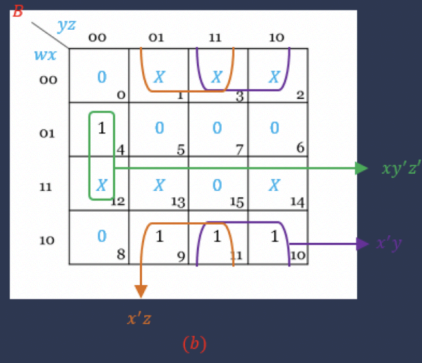
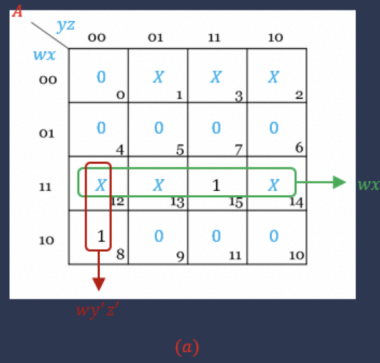
$$A = wx + wy'z'$$

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

$$C = y \oplus z$$

$$D = z$$

$$\begin{aligned}
 A &= wx + wy'z' \\
 B &= x'z + x'y + xy'z' \\
 C &= y'z + yz' = y \oplus z \\
 D &= z
 \end{aligned}$$



$$\begin{array}{rclclclcl}
 \mathbf{4.14} & \text{xor} & \text{AND} & \text{OR} & \text{XOR} & & \\
 & 10 & + & 5 & + & 5 & + & 10 & = 30 \text{ ns}
 \end{array}$$

4.18

Inputs $ABCD$	Outputs $wxyz$
0000	1001
0001	1000
0010	0111
0011	0110
0100	0101
0101	0100
0110	0011
0111	0010
1000	0001
1001	0000

$$d(A, b, c, d) = \Sigma(10, 11, 12, 13, 14, 15)$$

