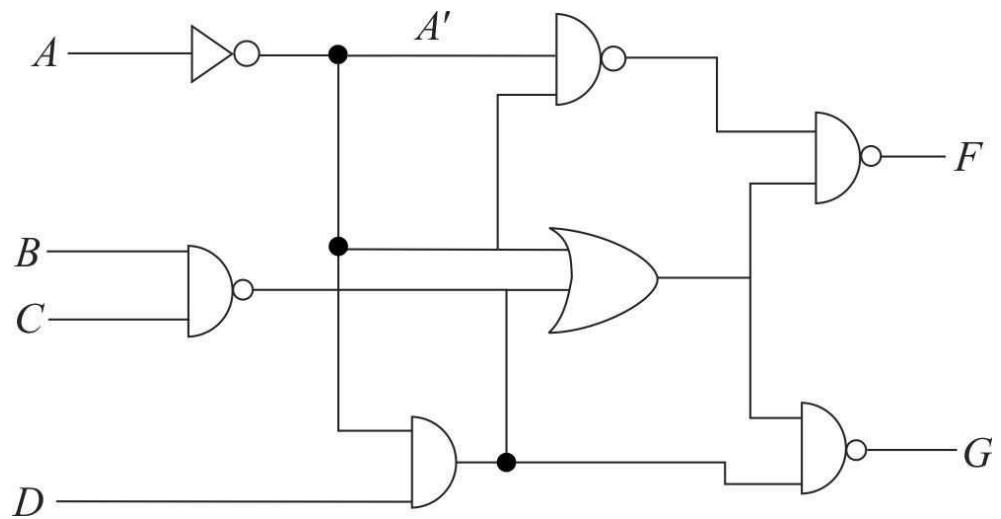


4.2



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

$$= A'D + (A' + BC)'$$

$$= A'D + A(BC)'$$

$$= A'D + AB' + AC'$$

$$C1(A, B, C, D) = ((A'D)(A' + BC))'$$

$$= (A'D)' + (A' + BC)'$$

$$= (A + D') + A(BC)'$$

$$= A + D' + AB' + AC'$$

$$= A(1 + B' + C') + D'$$

$$= A + D'$$

#### 4.4

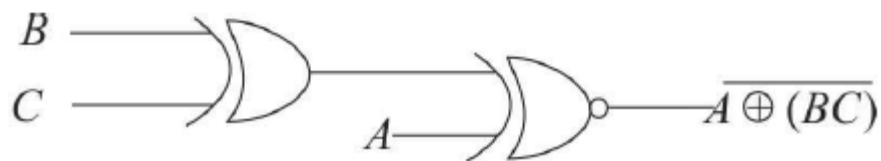
(a)  $F(A, B, C) = \Sigma(0, 1, 2, 7)$

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

Simplified SOP form:

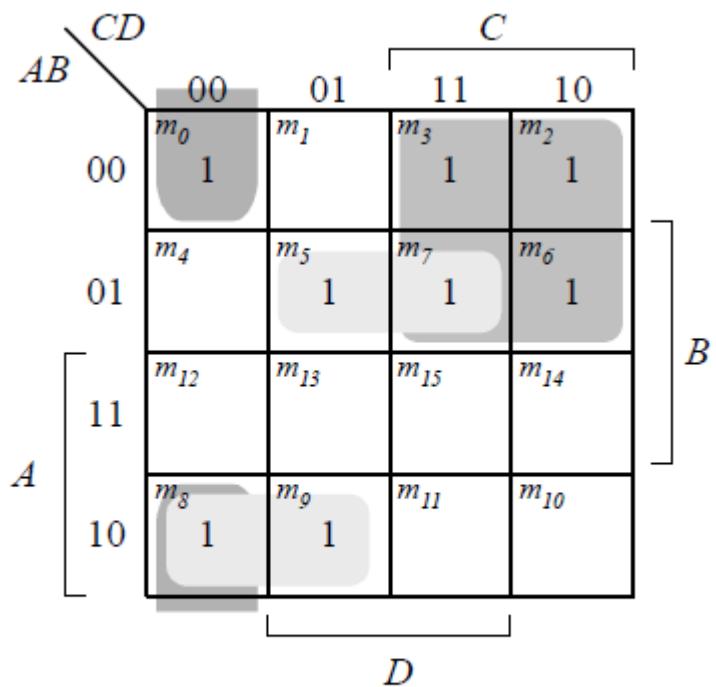
$$\begin{aligned}
 F(A, B, C) &= A'C' + A'B' + ABC \\
 &= A'(B' + C') + ABC \\
 &= A'(BC)' + ABC \\
 &= \underline{A \text{ XNOR } (BC)}
 \end{aligned}$$

$$= A \oplus (BC)$$



#### 4.9

<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



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

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

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

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

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

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

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

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

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

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

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

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

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

## 4.16

**(a)**

$$\begin{aligned}
 (C'G'i + p'i)' &= (Ci + Gi)Pi = GiPi + PiCi \\
 &= AiBi(Ai + Bi) + PiCi \\
 &= AiBi + PiCi = Gi + PiCi \\
 &= AiBi + (Ai + Bi)Ci = AiBi + AiCi + BiCi = Ci+1 \\
 (PiG'i) \oplus Ci &= (Ai + Bi)(AiBi)' \oplus Ci = (Ai + Bi)(A'i + B'i) \oplus Ci \\
 &= (A'iBi + AiB'i) \oplus Ci = Ai \oplus Bi \oplus Ci = Si
 \end{aligned}$$

**(b)**

$$\text{Output of NOR gate} = (A_0 + B_0)' = P'0$$

$$\text{Output of NAND gate} = (A_0B_0)' = G'0$$

$$S_1 = (P_0G_0)' \oplus C_0$$

$$C_1 = (C_0G_0 + P_0)' \text{ as defined in part (a)}$$

## 4.32

(a)  $F = S(0, 2, 5, 8, 10, 14)$

Inputs <i>ABCD</i>	Max input line ( <i>ABC</i> )	$F = \Sigma(0, 2, 5, 8, 10, 14)$
000 0 0 0	0	1 $F = D'$
000 1 0 1	1	0
001 0 1 2	1	1 $F = D'$
001 1 1 3	0	0
010 0 2 4	0	0 $F = D$
010 1 2 5	1	1
011 0 3 6	0	0 $F = 0$
011 1 3 7	0	0
100 0 4 8	1	1 $F = D'$
100 1 4 9	0	0
101 0 5 10	1	1 $F = D'$
101 1 5 11	0	0
110 0 6 12	0	0 $F = 0$
110 1 6 13	0	0
111 0 7 14	1	1 $F = D'$
111 1 7 15	0	0

