

4-2

晶片

8. 下列各等式分別是依據哪一項布林三法則推導出來的。

(a) $\overline{AB+CD} + \overline{EF} = AB+CD+\overline{EF} \Rightarrow \overline{A} = A$ #

(b) $A\overline{A}B + A\overline{B} + AB\overline{B} = A\overline{B} \Rightarrow A \cdot \overline{A} = 0$ #

(c) $A(BC+B\overline{C}) + A\overline{C} = A(B\overline{C}) + A\overline{C} \Rightarrow A + \overline{A} = A$ #

(d) $AB(C+\overline{C}) + AC = AB+AC \Rightarrow A + \overline{A} = 1$

(e) $A\overline{B} + A\overline{B}C = A\overline{B} \Rightarrow A + \overline{A}B = A + B$ #

(f) $ABC + \overline{A}B + \overline{A}BCD = ABC + \overline{A}B + D \Rightarrow A + \overline{A}B = A$

4-3

9. 在下列各表示式中應用狄摩根定理：

(H) $\overline{(A+\overline{B})(\overline{C}+D)}$
 $\overline{A+\overline{B}} + \overline{\overline{C}+D}$
 $= (\overline{A} \cdot B) + (C \cdot \overline{D})$

10. 在下列各表示式中應用狄摩根定理：

(a) $\overline{A\overline{B}(C+\overline{D})}$
 $\overline{A\overline{B}} + \overline{C+\overline{D}} = \overline{A+B} + \overline{C\overline{D}}$

(b) $\overline{AB(CD+EF)}$
 $\overline{A\overline{B}} + \overline{CD+EF} = \overline{A+B} + \overline{CD} \times \overline{EF} = \overline{A+B} + (\overline{C+D})(\overline{E+F})$

(c) $\overline{(A+\overline{B})(C+\overline{D})} + \overline{ABC\overline{D}}$
 $\overline{A\overline{B}C\overline{D}} + \overline{A+\overline{B}} + \overline{C+\overline{D}}$
 $= D(1 + \overline{A}\overline{B}\overline{C}) + \overline{A} + \overline{B} + \overline{C}$
 $= \overline{A+B+C} + D$

38. 利用卡諾圖找出各表示式的最小 SOP 形式:

(a) $\bar{A}\bar{B}\bar{C} + \bar{A}BC + A\bar{B}C$

$\bar{A}\bar{B} + \bar{B}C$ *

(b) $AC(\bar{B}+C)$
 $AC\bar{B} + AC$

AC *

(c) $\bar{A}(B+C\bar{C}) + A(B+C\bar{C})$
 $\bar{A}BC + \bar{A}B\bar{C} + ABC + AB\bar{C}$

B *

(d) $\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + AB\bar{C}$

\bar{C} *

39. 利用卡諾圖將下列各表示式化簡成最小 SOP 形式:

(c) $DE\bar{F} + \bar{D}EF + \bar{D}\bar{E}F$

$\bar{D}\bar{F} + E\bar{F} = \bar{F}(\bar{D}+E)$ #

42. 利用卡諾圖將下列各表示式簡化成最小 SOP 形式:

(a) $A+B\bar{C}+CD$
 $A\bar{C}\bar{C} + \bar{C}C + \bar{C}C$

$A + CD + B\bar{C}$ *

(b) $\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + ABCD + ABC\bar{D}$

$\bar{A}\bar{B}\bar{C} + ABC$ *

(c) $\bar{A}B(\bar{C}\bar{D} + \bar{C}D) + AB(\bar{C}\bar{D} + \bar{C}D) + \bar{A}\bar{B}\bar{C}D$
 $\bar{A}B\bar{C}\bar{D} + \bar{A}B\bar{C}D + AB\bar{C}\bar{D} + AB\bar{C}D + \bar{A}\bar{B}\bar{C}D$

$B\bar{C} + A\bar{C}D$ #

(d) $(\bar{A}\bar{B} + A\bar{B})(\bar{C}D + C\bar{D})$
 $\bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}C\bar{D}$

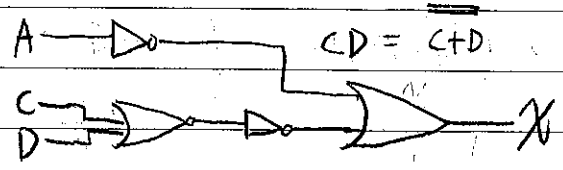
$\bar{B}C$ *

(e) $\bar{A}\bar{B} + A\bar{B} + \bar{C}\bar{D} + C\bar{D}$
 $\bar{A}\bar{B}XX + A\bar{B}XX + XX\bar{C}\bar{D} + XXC\bar{D}$

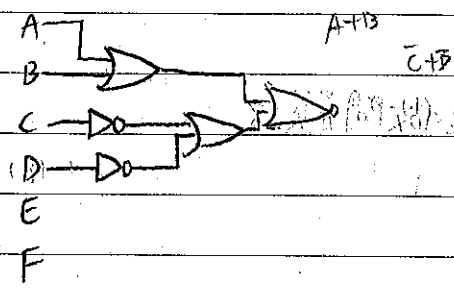
$D + \bar{B}D = D$ #

使用 NAND 閘、NOR 閘，或者兩者的組合來實現下列邏輯
 真值表式：

(a) $X = \bar{A}B + CD + (\bar{A}\bar{B})(ACD + \bar{B}E)$
 $\bar{A}B + CD + \bar{A}\bar{B}ACD + \bar{A}\bar{B}(\bar{B} + E)$
 $= \bar{A}B + CD + \bar{A}\bar{B} + \bar{A}\bar{B}E$
 $= \bar{A}B + CD + \bar{A}\bar{B}$
 $= \bar{A} + CD$

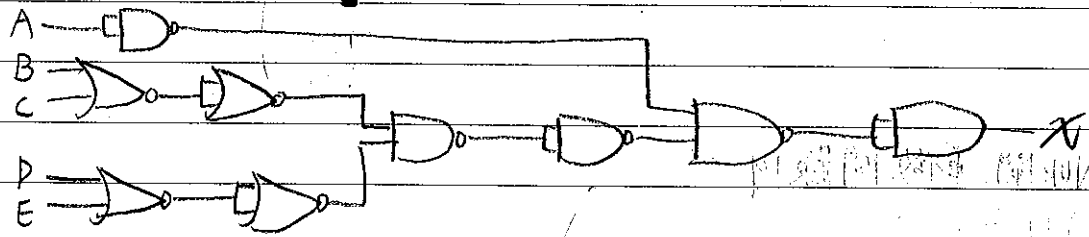


(b) $X = AB\bar{C}\bar{D} + D\bar{E}F + \bar{A} + \bar{F}$
 $AB\bar{C}\bar{D} + D\bar{E}F + \bar{A} + \bar{F}$
 $= AB\bar{C}\bar{D} + D\bar{E}F + \bar{A} + \bar{F}$



$A + B + \bar{C}\bar{D}$

(c) $X = \bar{A}[B + \bar{C}(D + E)]$

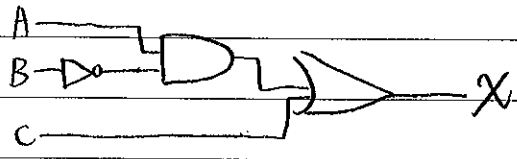


11. 根據表 5-6 的真值表來實現其邏輯電路

$X = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC + A\bar{B}C$

	C		
AB	00	01	11
00	0	1	1
01	0	1	1
11	0	1	1
10	0	1	1

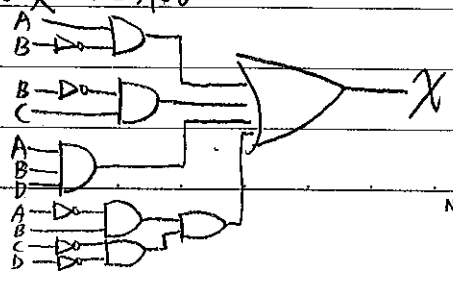
$\bar{C} + AB$



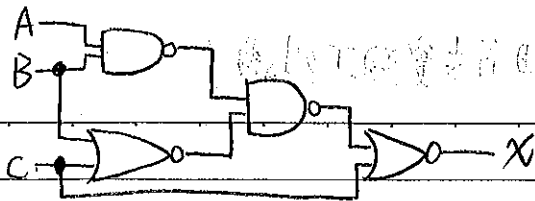
12. 根據表 5-7 的真值表，將邏輯電路實現出來。

$X = A\bar{B} + \bar{B}C + ACD + \bar{A}\bar{B}\bar{C}\bar{D}$

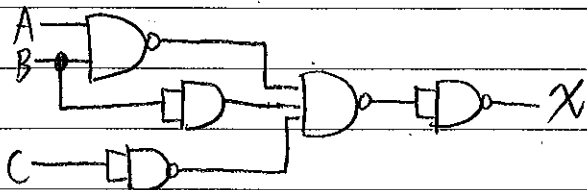
	CD			
AB	00	01	11	10
00	0	0	1	1
01	0	1	1	1
11	0	1	1	1
10	0	1	1	1



只用 NAND 閘, 實現出圖 5-42 的邏輯電路

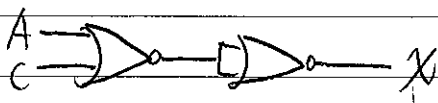


$$\begin{aligned}
 X &= (\overline{AB} \cdot \overline{BC}) + C = \overline{(\overline{AB} + \overline{BC})} + C = \overline{AB + BC} + C = \overline{AB} \cdot \overline{BC} \cdot \overline{C} \\
 &= \overline{AB} \cdot \overline{BC} \cdot \overline{C} \\
 &= \overline{AB} \cdot \overline{B} \cdot \overline{C}
 \end{aligned}$$

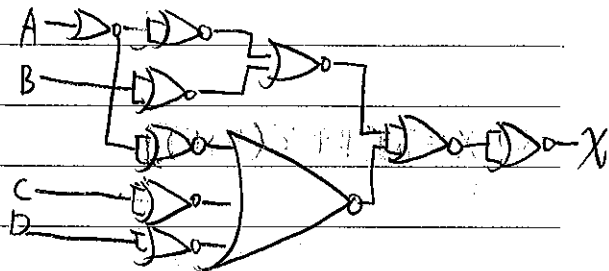


1. 只用 NOR 閘, 重做問題 18

(a) $X = \overline{AB} + A\overline{C} + \overline{A}$
 $= A + C$



(b) $X = \overline{A}B + \overline{A}CD$



2. 只用 NOR 閘, 重做問題 19

$$X = (\overline{A+B}) \cdot (\overline{B+C})$$

