第二章

$L_1 = AC(C+\bar{C}) + \bar{B}C + B\bar{D} + \overline{A}C\bar{D} + A\bar{B}DE = A + \bar{B}C + B\bar{D} + \bar{A}C\bar{D}$

1、试将下列逻辑函数化简成最简与–或表达式。$= A + \bar{B}C + B\bar{D}$

$L_1 = AC + \bar{B}C + B\bar{D} + A(B + \bar{C}) + \bar{A}CD + A\bar{B}DE$

$L_2(A, B, C) = \sum m(0, 2, 4, 6, 7)$

$L = \bar{C} + AB$

$L_3(A, B, C, D) = \sum m(0, 1, 4, 5, 6, 8, 9) + \sum d(10, 11, 12, 13, 14, 15)$

$L_3 = \bar{C} + A + \bar{A}B\bar{D}$
$= \bar{C} + B\bar{D}$

2、下列逻辑函数化简为最简与–或表达式。并写出 F_1 的与非—与非表达式；写出 F_2 的最简与或非表达式。(注：字母上均为短划)

$F_1 = \overline{A\bar{B} + BC} + \overline{AB} + A\bar{B}C = \bar{B}C + A\bar{B}C = A\bar{C} + B\bar{C} = \overline{\overline{A\bar{C}} \cdot \overline{B\bar{C}}}$

$F_2(A, B, C, D) = \sum m(2, 3, 6, 10, 12, 14) + \sum d(5, 9, 11)$

$F_3(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5, 8, 10, 11)$

$\bar{F_2} = AB\bar{D} + \bar{B}C + \bar{C}D$
$= \overline{\overline{\bar{C}D + \bar{B}C + AB\bar{D}}} = (\bar{C} + D)(B + \bar{C})(\bar{A} + \bar{B} + D)$
$= \overline{(B\bar{D} + \bar{C})(\bar{A} + \bar{B} + D)} = \overline{BD + \bar{C}A + \bar{C}\bar{B}}$

$F_3 = \bar{A}\bar{B} + \bar{A}\bar{C}\bar{D} + A\bar{B}\bar{D} + A\bar{B}C$
$= \bar{A}\bar{C} + \bar{B}\bar{C} + \bar{B}\bar{D}$

3、附图所示电路是一个多功能函数发生器，其中 $C_2C_1C_0$ 为控制信号，x, y 为数据输入。试列表说明当 $C_2C_1C_0$ 为不同取值组合时，输出端 L 的逻辑功能（L（x, y）的表达式）。
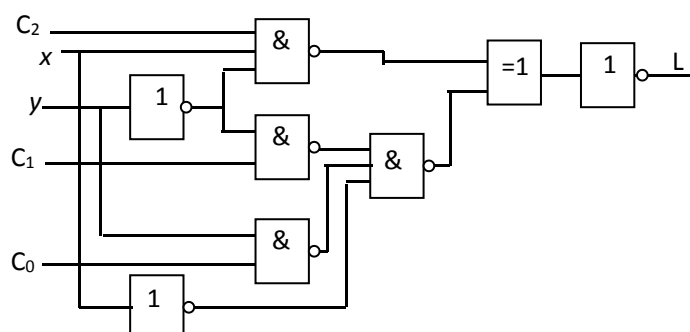
4、将下列逻辑函数(注：字母上均为短划) 化简为最简与或式：

(1) $F = A + A\overline{BC} + \overline{A}CD + \overline{C}E + \overline{D}E$

$= A + C\overline{D} + \overline{C}\,\overline{E} + \overline{D}E \quad \longrightarrow$ 用卡诺图

$= A + C\overline{D} + \overline{C}\,\overline{E} + \overline{D}E + DE$

$= A + CD + \overline{C}E + E$

$= A + CD + E$

5、将下列逻辑函数化简最简与或表达式：

$F_1 = A\overline{B} + \overline{\overline{A}\,\overline{C}} + \overline{B}C \quad \overline{F}_1 = (\overline{A}+B)(A+C)(B+\overline{C}) ,\ \overline{F}_1 = A\overline{B} + A\overline{C} + \overline{B}C$
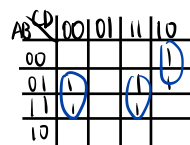
$F_2(A,B,C,D) = \sum m(0,3,5,8)$ 给定约束条件为 AB+AC=0

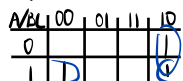$F_3(A,B,C,D) = \sum m(2,4,6,7,12,15)$

约束条件 $\Rightarrow$ A=1,B=1不能出现
A=1,C=1不能出现
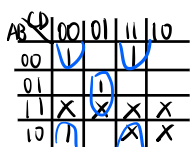
$F_3 = B\overline{C}D + BC\overline{D} + AC\overline{D}$

$F_2 = \overline{B}\,\overline{C}\,\overline{D} + \overline{B}CD + B\overline{C}D$
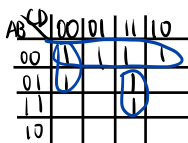
6、试将下列逻辑函数(字母上均为短划)化简成最简与-或表达式。

$F_1(A,B,C) = A\overline{BC} + \overline{A}\,\overline{B}\,\overline{C} + AB\overline{C} \qquad F_1 = A\overline{C} + \overline{B}\,\overline{C}$

$F_2(A,B,C,D) = \sum m(0,1,2,3,4,7,15)$

$F_2 = \overline{A}\,\overline{B} + \overline{A}\,\overline{C}\,\overline{D} + BCD$
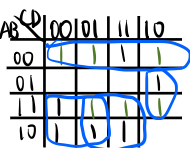
7、将下述逻辑函数(注：字母上均为短划) 化简为最简与或式：

(1) $F_1(A,B,C,D) = \sum m(3,6,8,9,11,12) + \sum d(0,1,2,13,14,15)$

(2) $F_2 = \overline{\overline{A}\,\overline{CD} + \overline{B}D + A\overline{\overline{B}\,\overline{C}}}$

(1) $F_1 = \overline{A}\,\overline{B} + A\overline{C} + AD + BC\overline{D}$

(2) $\overline{F}_2 = (\overline{A}+C+\overline{D})(B+\overline{D})(\overline{A}+B+C)$

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

$= \overline{A}B + C\overline{D} + BC + A\overline{D}$

8、（1）将下列逻辑函数(注：字母上均为短划)化简为最简与-或表达式；（2）写出 F_1 的与非一与非表达式；（3）写出 F_2 的最简与或非表达式。

1. $F_1 = \overline{A\overline{B} + BC} + \overline{\overline{A}\,\overline{B}} + A\overline{B}\,\overline{C}$

2. $F_2(A,B,C,D) = \sum m(0,1,2,3,4,7,15) + \sum d(8,9,10,11,12,13)$

3. $F_3(A,B,C,D) = \overline{A}B\overline{C} + ABC + \overline{A}\,\overline{C}D + \overline{A}CD + B\overline{D}$

1. $F_1 = B\overline{C} + A\overline{B}\,\overline{C} = A\overline{C} + B\overline{C} = \overline{\overline{A\overline{C}}\cdot\overline{B\overline{C}}}$

2. $F_2 = \overline{B} + \overline{C}\overline{D} + \textcircled{D}$

3. $F_3 = \overline{A}D + B\overline{C} + B\overline{D}$

9、将下列逻辑函数(注：字母上均为短划) 化简为最简与或式：

$$F_1(A,B,C,D) = \sum m(2,3,4,6,8)$$

$$F_3 = \overline{\overline{\overline{ABD}} + \overline{\overline{A}\,\overline{C}} + \overline{\overline{BCD}} + \overline{\overline{B}\,\overline{D}} + \overline{AC}}$$

$F_1 = \overline{A}\,\overline{B}C + \overline{A}B\overline{D} + A\overline{B}\,\overline{C}\,\overline{D}$

$\overline{F_3} = (A+\overline{B}+\overline{D})(A+C)(B+\overline{C}+D)(B+D)(\overline{A}+\overline{C})$

$F_3 = \overline{A}BD + \overline{A}C + \overline{B}C\overline{D} + \overline{B}\,\overline{D} + AC$

$\quad = B + D + AC$

10、化简下列逻辑函数为最简与或式：

(1) $F_1 = A\overline{B} + \overline{\overline{AC} + \overline{B}C}$

(2) $F_2(A,B,C,D) = \sum m(0,1,2,3,4,7,15) + \sum d(8,9,10,11,12,13)$

(1) $\overline{F_1} = (\overline{A}+B)(A+\overline{C})(B+\overline{C})$

$\rightarrow \overline{F_1} = A\overline{B} + \overline{A}\,\overline{C} + B\overline{C}$

$\quad = A + \overline{C}$

(2) 同 8·2