数字电子技术第一次作业

1.7

$(100)_{10}=(64)_{16}=(1100100)_2$ $\quad$ $(127)_{10}=(7F)_{16}=(1111111)_2$

$(255)_{10}=(FF)_{16}=(11111111)_2$ $\quad$ $(16\ 5)_{10}=(10\ 8)_{16}=(10000\ 1)_2$

$(50\ 375)_{10}=(32\ 6)_{16}=(110010\ 011)_2$

1.8

$(1011)_2=(B)_{16}=(11)_{10}$ $\quad$ $(10000000)_2=(80)_{16}=(128)_{10}$

$(11001\ 011)_2=(19\ 6)_{16}=(25.375)_{10}$ $\quad$ $(1010\ 0101)_2=(A\ 5)_{16}=(10\ 3125)_{10}$

1.9

$(AF3C)_{16}=(1010\ 1111\ 0011\ 1100)_2=(127474)_8$ $\quad$ $(0F)_{16}=(0000\ 1111)_2=(017)_8$

$(80)_{16}=(1000\ 0000)_2=(200)_8$ $\quad$ $(3BD\ 8)_{16}=(0011\ 1011\ 1101\ 1)_2=(1675\ 8)_{10}$

1.10

$(+1011)_2$ 原码 01011 反码: 01011 补码: 01011

$(+00110)_2$ 原码: 000110 反码: 000110 补码: 000110

$(-1101)_2$ 原码: 11101 反码: 10010 补码: 10011

$(-00101)_2$ 原码: 100101 反码: 111010 补码 111011

1.11

(1) 证: $A\oplus 1=\overline{A}$

A	$A\oplus 1$	$\overline{A}$
0	1	1
1	0	0

(2) 证: $A\oplus 0=A$

A	$A\oplus 0$	A
0	0	0
1	1	1

(3) 证: $A(B\oplus C)=AB\oplus AC$

A	B	C	AC	AB	$B\oplus C$	$A(B\oplus C)$	$AB\oplus AC$
0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	0
0	1	0	0	0	1	0	0
0	1	1	0	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	0	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	0	0	0

(4) $A \oplus \bar{B} = \overline{A \oplus B}$

A	B	$\bar{B}$	$A\oplus\bar{B}$	$A\oplus B$	$\overline{A\oplus B}$
0	0	1	1	0	1
0	1	0	0	1	0
1	0	1	0	1	0
1	1	0	1	0	1

(5) $(A\oplus B)\oplus C = A\oplus(B\oplus C)$

A	B	C	$A\oplus B$	$(A\oplus B)\oplus C$	$B\oplus C$	$A\oplus(B\oplus C)$
0	0	0	0	0	0	0
0	0	1	0	1	1	1
0	1	0	1	1	1	1
0	1	1	1	0	0	0
1	0	0	1	1	0	1
1	0	1	1	0	1	0
1	1	0	0	0	1	0
1	1	1	0	1	0	1

112 (1) $Y = \bar{A}BC + AC + B\bar{C}$

$= \sum_m (2.3.5.6.7)$

(2) $Y = A\overline{BC}D + BCD + AC$

$= \sum_m (7.9, 10, 11. 14. 15)$

(3) $Y = AB + BC + ACD$

$= \sum_m (6.7. 11, 12, 13. 14, 15)$

(4) $Y = AB + \overline{\overline{BC}(\bar{C}+\bar{D})} = AB + BC + CD$ (德摩根律化简)

$= \sum_m (3,6,7. 11. 12. 13. 14. 15)$

0 0 1

113 (1) $Y = (A+B)(\bar{A}+\bar{B}+\bar{C})$

$= (A+B+C)(A+B+\bar{C})(\bar{A}+\bar{B}+\bar{C}) = \prod M(0.1.7)$

(2) $Y = A\bar{B} + \bar{A}C = (A+B+C)(A+\bar{B}+C)(\bar{A}+\bar{B}+C)(\bar{A}+\bar{B}+\bar{C}) = \prod M(0.2.6, 7)$

(3) $Y = BC\bar{D} + \bar{A}D + C$

$= \prod M(0,4,8,9,12,13)$

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

(4) $Y = \sum(m_1, m_2, m_4, m_6, m_7)$

$= (\bar{A}+\bar{B}+\bar{C})(\bar{A}+B+C)(A+\bar{B}+C) = \prod M(0.3.5)$

115 (1) $Y = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$

(2) $Z = \bar{M}\bar{N}PQ + \bar{M}NP\bar{Q} + \bar{M}NPQ + MN\bar{P}\bar{Q} + MN\bar{P}\bar{Q} + MN\bar{P}Q + MNP\bar{Q} + MNPQ$

117 (1) $Y = (A+B)(\bar{A}+C) + BC$

$\bar{Y} = (\bar{A}\bar{B} + A\bar{C})\ \bar{B}\bar{C} = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C}$

$= \bar{B}\bar{C}$

(2) $Y = (\overline{A+C} + BD)(\overline{AD + \bar{B}C + A\bar{B}D})$

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

$= ((A+C)(\bar{B}+\bar{D})) + ((AD + \bar{B}C) \cdot (\bar{A}+B+\bar{D}))$

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

(3) $Y=\left[\overline{(A+D)\overline{AC}}+\bar{A}B\bar{D}\right](\overline{A+C}+BD)$

$\bar{Y}=\left[\left(\overline{\bar{A}\bar{D}+(\overline{\bar{A}+\bar{C}}}\right)\ (A+\bar{B}+D)\right]+(\overline{\bar{A}\bar{C}})(\bar{B}+\bar{D})$

$=\left[\left(A\bar{C}+\bar{A}D+\bar{C}D\right)\ (A+\bar{B}+D)\right]+(A+C)(\bar{B}+\bar{D})$

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

(4) $Y=\overline{(A\oplus C)(B+\bar{D})}(BD+AC)=\overline{(A\bar{C}+\bar{A}C)(B+\bar{D})}\ (BD+AC)$

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

$=AB\bar{C}+\bar{A}BC+\bar{A}\bar{B}+\bar{A}\bar{D}+\bar{B}\bar{C}+\bar{C}\bar{D}$

118 (1) $Y=A(B+C)+BC\overline{A\bar{B}}$

$\therefore\ Y'=(A+BC)\ \ (B+C+\overline{A+\bar{B}})$

(2) $Y=(A+C)(\bar{B}+\bar{D})+\overline{\bar{B}C+D}\,AD$

$Y'=(AC+\bar{B}\bar{D})\ \left(\left(\overline{(\bar{B}+C)\ D}\right)+A+D\right)$

(3) $Y=\overline{A\bar{B}+\bar{A}CD}+\overline{B+C}\,(A+\bar{B}+D)$

$Y'=\left[\overline{(A+\bar{B})\ (\bar{A}+C)+D}\right]\cdot(\overline{BC}+A\bar{B}D)$

(4) $Y=\overline{(A+\bar{B})(\bar{C}+D)(A+B+\bar{C})}+(\bar{A}+\bar{B})C$

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

119

(1) $Y=A\bar{B}+B+\bar{A}C=A+B+\bar{A}C=A+B+C$

(2) $Y=\overline{\bar{A}BC}+\overline{A\bar{B}}=(A+\bar{B}+\bar{C})+(\bar{A}+B)=1$

(3) $Y=A\bar{B}CD+ABD+A\bar{C}D=A\bar{B}CD+ABCD+AB\bar{C}D+A\bar{C}D$

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

(4) $Y=A\bar{C}+ABC+AC\bar{D}+CD=A\bar{C}+ABC+AC\bar{D}+ACD+\bar{A}CD$

$=A\bar{C}+AC+ABC+\bar{A}CD=A\bar{C}+AC+\bar{A}CD=A+\bar{A}CD=A+CD$

(5) $Y=A\bar{B}(\bar{A}CD+\overline{AD+\bar{B}C})(\bar{A}+B)=A\bar{B}\ \overline{A\bar{B}}\ (\bar{A}CD+\overline{AD+\bar{B}C})=0$

(6) $Y=(\bar{A}+B)(\bar{B}+C)(\bar{C}+D)(\bar{D}+A)=\bar{A}\bar{B}\bar{C}\bar{D}+ABCD$

(7) $Y=AC(\bar{C}D+\bar{A}B)+BC(\overline{\bar{B}+AD+CE})$

$=BC\cdot((\bar{B}+AD)\ (\bar{C}+\bar{E}))=BC\ AD\ \bar{E}=ABCD\bar{E}$

(8) $Y=A\bar{B}C\bar{D}+\bar{A}BC\bar{D}+\overline{\bar{B}C\bar{D}}=\bar{A}BC\bar{D}+\overline{\bar{B}C\bar{D}}+A$

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