

总得分是 95 分

1. 将下列二进制数转换为等值的十进制数。

(1)  $(11011)_2$  (2)  $(10010111)_2$

(3)  $(1101101)_2$  (4)  $(11111111)_2$

(5)  $(0.1001)_2$  (6)  $(0.0111)_2$

(7)  $(11.001)_2$  (8)  $(101011.11001)_2$

解: (1)  $(11011)_2 = (2^4 + 2^3 + 2 + 1)_{10} = (27)_{10}$

(2)  $(10010111)_2 = (2^7 + 2^5 + 2^2 + 2 + 1)_{10} = (151)_{10}$

(3)  $(1101101)_2 = (2^6 + 2^5 + 2^3 + 2^2 + 1)_{10} = (109)_{10}$

(4)  $(11111111)_2 = (2^8 - 1)_{10} = (255)_{10}$

(5)  $(0.1001)_2 = (2^{-1} + 2^{-4})_{10} = (0.5625)_{10}$

(6)  $(0.0111)_2 = (2^{-2} + 2^{-3} + 2^{-4})_{10} = (0.4375)_{10}$

(7)  $(11.001)_2 = (2 + 1 + 2^{-3})_{10} = (3.125)_{10}$

(8)  $(101011.11001)_2 = (2^5 + 2^3 + 2 + 1 + 2^{-1} + 2^{-2} + 2^{-5})_{10} = (43.78125)_{10}$

2. 将下列二进制数转换为等值的十六进制数

(1)  $(1010111)_2$  (2)  $(110111011)_2$

(3)  $(10110.011010)_2$  (4)  $(101100.110011)_2$

解: (1)  $(\underline{0101} \underline{011})_2 = (57)_{16}$

(2)  $(\underline{0001} \underline{1011} \underline{1011})_2 = (1BB)_{16}$

(3)  $(\underline{0001} \underline{0110} . \underline{0110} \underline{1000})_2 = (16.b8)_{16}$

(4)  $(\underline{0010} \underline{1100} . \underline{1100} \underline{1100})_2 = (2C.CC)_{16}$

3. 列出步骤将下列十进制数转换为等值二进制

64, 129, 222, 254.1875

解:

$$\begin{array}{r} 2 \overline{) 64} \quad 0 \\ 2 \overline{) 32} \quad 0 \\ 2 \overline{) 16} \quad 0 \\ 2 \overline{) 8} \quad 0 \\ 2 \overline{) 4} \quad 0 \\ 2 \overline{) 2} \quad 0 \\ 2 \overline{) 1} \quad 1 \\ 0 \end{array}$$

$$\begin{array}{r} 2 \overline{) 129} \quad 1 \\ 2 \overline{) 64} \quad 0 \\ 2 \overline{) 32} \quad 0 \\ 2 \overline{) 16} \quad 0 \\ 2 \overline{) 8} \quad 0 \\ 2 \overline{) 4} \quad 0 \\ 2 \overline{) 2} \quad 0 \\ 2 \overline{) 1} \quad 1 \\ 0 \end{array}$$

$$\begin{array}{r} 2 \overline{) 222} \quad 0 \\ 2 \overline{) 111} \quad 1 \\ 2 \overline{) 55} \quad 1 \\ 2 \overline{) 27} \quad 1 \\ 2 \overline{) 13} \quad 1 \\ 2 \overline{) 6} \quad 0 \\ 2 \overline{) 3} \quad 1 \\ 2 \overline{) 1} \quad 1 \\ 0 \end{array}$$

$$(64)_{10} = (1000000)_2$$

$$(129)_{10} = (10000001)_2$$

$$(222)_{10} = (11011110)_2$$

$$\begin{array}{r} 2 \overline{) 254} \quad 0 \\ 2 \overline{) 127} \quad 1 \\ 2 \overline{) 63} \quad 1 \\ 2 \overline{) 31} \quad 1 \\ 2 \overline{) 15} \quad 1 \\ 2 \overline{) 7} \quad 1 \\ 2 \overline{) 3} \quad 1 \\ 2 \overline{) 1} \quad 1 \\ 0 \end{array}$$

$$\begin{array}{r} 0.1875 \\ \times \quad 2 \\ \hline 0.3750 \quad 0 \\ \times \quad 2 \\ \hline 0.750 \quad 0 \\ \times \quad 2 \\ \hline 1.50 \quad 1 \\ \times \quad 2 \\ \hline 0.5 \\ \times \quad 2 \\ \hline 1.0 \quad 1 \end{array}$$

$$(254.1875)_{10} = (11111110.0011)_2$$

$$(254.1875)_{10} = (11111110.0011)_2$$

4. 将下列十进制数表示为8421BCD 码。

(1)  $(43)_{10}$  (2)  $(95.12)_{10}$

(3)  $(67.58)_{10}$  (4)  $(932.1)_{10}$

解: (1)  $(43)_{10} = (0100\ 0011)_{8421BCD}$

(2)  $(95.12)_{10} = (1001\ 0101 . 0001\ 0010)_{8421BCD}$

(3)  $(67.58)_{10} = (0110\ 0111 . 0101\ 1000)_{8421BCD}$

(4)  $(932.1)_{10} = (1001\ 0011\ 0010 . 0001)_{8421BCD}$

3.  $Y_3 = \overline{A}\overline{B}\overline{C} + \overline{A}\overline{B}D + \overline{B}\overline{C}D + \overline{A}\overline{B}D + \overline{A}\overline{B}C$

4.  $Y_4 = \overline{B}\overline{C} + \overline{A}CD$ , 约束项,  $AB+AC=0$

解: (1).  $Y_1 = (A + \overline{A}\overline{B}\overline{C}D) + B + C$   
 $= A + (B + \overline{B}\overline{C}D) + C$   
 $= A + B + (C + \overline{C}D)$   
 $= A + B + C + D$

(2)  $Y_2 = \overline{B}(\overline{A}\overline{C} + \overline{A}C + AC + AC) + \overline{A}BC$   
 $= \overline{B}(\overline{A}\overline{C} + C) + \overline{A}BC$   
 $= \overline{B}(A + C) + \overline{A}BC$   
 $= \overline{A}\overline{B} + \overline{B}C + \overline{A}BC$   
 $= \overline{A}\overline{B} + (\overline{A} + \overline{B})C = \overline{A}\overline{B} + \overline{A}C + \overline{B}C$

批注 [宝贝1]: (2)应进一步化简为  
 $\overline{A}\overline{B} + \overline{A}C$ , 扣分 (-1)

$$\begin{aligned}
 (3) \quad Y_3 &= \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}\bar{D} + \bar{B}\bar{C}\bar{D} + A\bar{B}\bar{D} + A\bar{B}C \\
 &= \bar{B}(\bar{A}\bar{C} + \bar{A}\bar{D} + \bar{C}\bar{D} + A\bar{D} + AC) \\
 &= \bar{B}(\bar{A}\bar{C} + (\bar{A}+A)\bar{D} + \bar{C}\bar{D} + AC) \\
 &= \bar{B}(\bar{A}\bar{C} + \bar{D} + \bar{C}\bar{D} + AC) \\
 &= \bar{B}(\bar{A}\bar{C} + AC + \bar{D}) \\
 &= \bar{B}(A \oplus C + \bar{D})
 \end{aligned}$$

$$(4) \quad Y_4 = \bar{B}\bar{C} + \bar{A}C\bar{D} \quad (\text{约束项 } AB+AC=0)$$

$$\begin{aligned}
 \because AB+AC &= 0 \\
 \therefore \overline{(AB+AC)} &= 1 \\
 (\bar{A}+\bar{B})(\bar{A}+\bar{C}) &= 1 \\
 \bar{A} + \bar{A}\bar{B} + \bar{A}\bar{C} &= 1 \\
 \bar{A} &= 1
 \end{aligned}$$

$$\therefore Y_4 = \bar{B}\bar{C} + C\bar{D}$$

6. 用真值表证明下列各式相等。

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

(2)  $A(B \oplus C) = (AB) \oplus (AC)$

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

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

证明: (1)

A	B	A+B	$\overline{AB+B+\bar{A}B}$
0	0	0	0
0	1	1	1
1	0	1	1
1	1	1	1

$$\therefore \overline{AB+B+\bar{A}B} = A+B$$

(2)

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

$$\therefore A(B \oplus C) = (AB) \oplus (AC)$$

(3)

A	B	C	$\overline{AB+C}$	$(\bar{A}+B)\bar{C}$
0	0	0	1	1
0	0	1	0	0
0	1	0	1	1
0	1	1	0	0
1	0	0	0	0
1	0	1	0	0
1	1	0	1	1
1	1	1	0	0

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

(4)

A	B	C	$\overline{AB+\bar{A}C}$	$\bar{A}\bar{B} + \bar{A}\bar{C}$
0	0	0	1	1
0	0	1	0	0
0	1	0	1	1
0	1	1	0	0
1	0	0	1	1
1	0	1	1	1
1	1	0	0	0
1	1	1	0	0

$\therefore \overline{AB+\bar{A}C} = \bar{A}\bar{B} + \bar{A}\bar{C}$

10.

A \ BC	00	01	11	10
0	0	1	1	1
1	0	1	0	1

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

(2)

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

$$Y_2(A, B, C, D) = \bar{A}\bar{D} + \bar{B}\bar{D}$$

(3)

A \ BC	00	01	11	10
0	1	1	0	1
1	0	1	1	1

$$Y_3(A, B, C) = \bar{A}\bar{B} + AC + B\bar{C}$$

(4)

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

$$Y_4(A, B, C, D) = A + \bar{B}\bar{D} + \bar{B}\bar{C}$$

$$(1) F = ABC + BC = \overline{(\bar{A} + \bar{B} + \bar{C})}(\bar{B} + \bar{C}) = \overline{\bar{A} + \bar{B} + \bar{C}} + \bar{B} + \bar{C}$$

批注 [宝贝2]: 应化简, 最后只有包含,  $(B' + C')$  项, 扣分(-1)

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

批注 [宝贝3]: 应化简只包含  $(A+C)$  项, 扣分(-1)

$$(3) F = ABCD + BCD + ABD \\ = BCD + ABD \\ = \overline{(\bar{B} + \bar{C} + \bar{D})}(\bar{A} + \bar{B} + \bar{D}) \\ = \overline{(\bar{B} + \bar{C} + \bar{D})} + \overline{(\bar{A} + \bar{B} + \bar{D})}$$

批注 [宝贝4]: 应为下面方式, 扣分(-1)

答案应为:  $F = BCD + ABD = BD(A+C) = ((BD)' + (A+C)')' = (B' + D' + (A+C)')'$

$$(4) F(A, B, C, D) = \sum m(0, 2, 3, 8, 9, 10, 11, 13)$$

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

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

批注 [宝贝5]: 有误, 正确如下, 扣分(-1)

$F = B'D' + B'C + AC'D = ((B+D)' + (B+C')' + (A'+C+D')')'$