یالطیف

رضا آذین پور
۹۸۱۴۳۰۳
تمرین سری ۱ - سیستم دیجیتال

#1 الف) $(4310)_5 = 4\times5^3 + 3\times5^2 + 1\times5^1 + 0 = (580)_{10}$

ب) $(198)_{12} = 1\times12^2 + 9\times12^1 + 8\times12^0 = 144 + 108 + 8 = (260)_{10}$

ج) $(10110.0101)_2$

$(10110)_2 = 1\times16 + 1\times4 + 1\times2 = (22)_{10}$ (16 8 4 2 1)

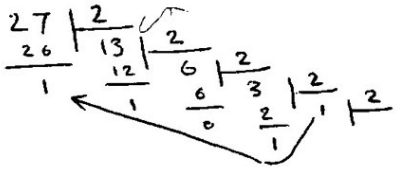
$(0.0101)_2 = 1\times0.25 + 1\times0.0625 = (0.3125)_{10}$ (0.5 0.25 0.0625, 0.125)

$\Rightarrow (22.3125)_{10}$

د) $(26.24)_8 = 2\times8^1 + 6\times8^0 + 2\times8^{-1} + 4\times8^{-2} = 16 + 6 + 0.25 + 0.25 = (22.5)_{10}$

ه) $(FAFA)_{16} = 15\times16^3 + 10\times16^2 + 15\times16^1 + 10\times16^0 = 61440 + 2560 + 240 + 10 = (64250)_{10}$

#2 الف) $(27.315)_{10} \equiv (011011.010100001\cdots)_2$



$0.315\times2 = 0.63$ (0)
$0.63\times2 = 1.26$ (1)
$0.26\times2 = 0.52$ (0)
$0.52\times2 = 1.04$ (1)
⋮

هر سه بیت معادل با مبنای ۸ : $(011011.010100)_2 \equiv (22.2550)_8$

هر ۴ بیت معادل با مبنای ۱۶ : $(011011.010100)_2 \equiv (111.250625)_{16}$

ب) $(971.204)_{10} \equiv (0111100101.0011010100001\cdots)_2$

$\equiv (1725.125625)_8 \equiv (395.187525)_{16}$

ج) $(44.7102)_{10} \equiv (0101100.101101\cdots)_2 \equiv (54.625625)_8$

$\equiv (2C.687525)_{16}$

د) $(0.634)_{10} \equiv (0.10100\cdots)_2 \equiv (0.625)_8 \equiv (0.625)_{16}$

#3 الف) $(231.3)_4 \longrightarrow$ مبنای 7 : $2\times4^2+3\times4^1+3\times4^0+3\times4^{-1}=32+12+3+0.75=(47.75)_{10}$

$47 \mid 7$, $42 \mid 6$, $5 \mid 7$, 0

$0.5\times7=3.5$, $0.5\times7=3.5$ $\Rightarrow (50.33)_7$

ب) $(457.632)_8 \equiv (100101111.110011010)_2$ (Binary ← مبنای دو)

ج) $(73852)_9 \rightsquigarrow$ مبنای 3 : $7\times9^4+3\times9^3+8\times9^2+5\times9^1+2\times9^0=45927+2187+648+45+2=(48809)_{10}$

$48809 \mid 3$, $48807 \mid 16269$, $2 \mid 3$, $16269 \mid 5423$, $0 \mid 3$, $5421 \mid 1807$, $2 \mid 3$, $1806 \mid 602$, $1 \mid 3$, $600 \mid 200$, $2 \mid 3$, $198 \mid 66$, $2 \mid 3$, $3 \mid 1$, 0

$\Rightarrow (10221202)_3$

#4 الف) $\begin{cases} A=(101)_2 \\ B=(1011)_2 \end{cases} \Rightarrow A+B=$ 1011 + 0101 = 10000 , $A*B=$ 1011 * 0101 = 0000 + 1011 + 0000 = 10110

ب) $\begin{cases} A=(45)_8 \\ B=(64)_8 \end{cases} \Rightarrow A+B=$ 64 + 45 = 157

45 * 64 = 220 + 330 = 550

ج) $\begin{cases} A=(5C2A)_{16} \\ B=(7D10)_{16} \end{cases} \Rightarrow A+B=$ 5C2A + 7D10 = D93A , $A*B=$ BC2A * 7D10 = 0000 + BC2A + 98E22 + 52526 = F6F72

#5 الف) $(111011)_2 / (101)_2 \rightsquigarrow (1011)_2$

ب) $(1010011)_2 / (1001)_2 \rightsquigarrow (1001)_2$

#6 الف) $(01110110)_2 \rightarrow$ { 2-S complement : $(10001010)_2$; 1-S complement : $(10001001)_2$

ب) $(476.23)_8 \rightarrow$ { 8-S complement : $(302.55)_8$; 7-S complement : $(301.54)_8$

ج) $(307.523)_{10} \rightarrow$ { 10-S complement : $(693.477)_{10}$; 9-S complement : $(692.476)_{10}$

#7 $(5137)_{10} \equiv (0101\ 0001\ 0011\ 0111)_{BCD} \equiv (0001010000010001)_2$

$\equiv (0001111000011001)_{gray}$

ب) $(492)_{10} \equiv (000111101100)_2 \equiv (0100\ 1001\ 0010)_{BCD} \equiv (000100011010)_G$

ج) $(207)_{10} \equiv (11001111)_2 \equiv (0010\ 0000\ 0111)_{BCD} \equiv (10101000)_{gray}$

#8 الف) $101010 - 101011 \Rightarrow$

$$\begin{array}{r} 101010 \\ 010101\ + \\ \hline 111111 \end{array}$$

ب) $1011 - 110001 \Rightarrow$

$$\begin{array}{r} {\scriptstyle 1\ 1\ 1\ 1} \\ 001011 \\ 001111\ + \\ \hline 011010 \end{array}$$

ج) $11011 - 11010 \Rightarrow$

$$\begin{array}{r} {\scriptstyle 1\ 1\ 1} \\ 11011 \\ 00110\ + \\ \hline 100001 \end{array}$$

د) $110110 - 10101 \Rightarrow$

$$\begin{array}{r} {\scriptstyle 1\ 1\ 1\ 1} \\ 110110 \\ 001011\ + \\ \hline 1000001 \end{array}$$

Moris Mano Problem :

#2 a) 32 K bytes $\longrightarrow 32 \times 10^3$ byte $\longrightarrow 256 \times 10^3$ bits

b) 64 M bytes $\longrightarrow 64 \times 10^6$ byte $\longrightarrow 512 \times 10^6$ bits

c) 6.4 G bytes $\longrightarrow 6.4 \times 10^9$ byte $\longrightarrow 51.2 \times 10^9$ bits

#20 $(+49)_{10} \longrightarrow$

$49 \mid 2$, $48 \mid 24 \mid 2$, $24 \mid 12 \mid 2$, $12 \mid 6 \mid 2$, $6 \mid 3 \mid 2$, $2 \mid 1$, $1 \mid 2$

$\Rightarrow (110001)_2$

$(+29)_{10} \longrightarrow$ $29 \mid 2$, $28 \mid 14 \mid 2$, $14 \mid 7 \mid 2$, $6 \mid 3 \mid 2$, $2 \mid 1$, $1 \mid 2$

$\Rightarrow (11101)_2$

$(-49)_{10} \equiv (-001111)_2$, $(-29)_{10} \equiv (-00011)_2$

$(+29) + (-49) =$

$$\begin{array}{r} 011101 \\ +\ 001111 \\ \hline 101100 \end{array} \longrightarrow (-44)_{10}$$

$-29 + (+49) =$

$$\begin{array}{r} 110001 \\ +\ 000011 \\ \hline 110100 \end{array} \longrightarrow (-52)_{10}$$

$-29 + (-49) =$

$$\begin{array}{r} 001111 \\ +\ 000011 \\ \hline 010010 \end{array} \longrightarrow (+18)_{10}$$

#23

$a = (791)_{10} \longrightarrow (0111\ 1001\ 0001)_{BCD}$

$b = (658)_{10} \longrightarrow (0110\ 0101\ 1000)_{BCD}$

$\Rightarrow a + b = 791 + 658 = 1449 \Rightarrow$

$$\begin{array}{r} 0111\ \ 1001\ \ 0001 \\ +\ 0110\ \ 0101\ \ 1000 \\ \hline 1101\ \ 1110\ \ 1001 \\ +\ \ \ \ 0110\ \ 0110 \\ \hline (1)\ 0100\ \ 0100\ \ 1001 \end{array} = 1449$$

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