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- CENG 214 ASSIGNMENT - 1 -

Decimal	Hexadecimal	Octal	Binary
587.254	24B.41	1113.202	1001001011.01000001
56338.269	DC12.45	156022.212	11011100000010010.0100010
298.40625	12A.68	452.32	100101010.011010
57.5625	39.9	71.44	111001.1001

Question 1-) Converting decimal number 587.254 into binary number

$$\begin{array}{r}
 587 \div 2 = 293 \text{ R } 1 \\
 293 \div 2 = 146 \text{ R } 1 \\
 146 \div 2 = 73 \text{ R } 0 \\
 73 \div 2 = 36 \text{ R } 1 \\
 36 \div 2 = 18 \text{ R } 0 \\
 18 \div 2 = 9 \text{ R } 0 \\
 9 \div 2 = 4 \text{ R } 1 \\
 4 \div 2 = 2 \text{ R } 0 \\
 2 \div 2 = 1 \text{ R } 0 \\
 1 \div 2 = 0 \text{ R } 1
 \end{array}$$

integer part in binary

1001001011

①

Fractional Part

$0.254 \times 2 \Rightarrow$	0.508	0
$0.508 \times 2 \Rightarrow$	1.016	1
$0.016 \times 2 \Rightarrow$	0.032	0
$0.032 \times 2 \Rightarrow$	0.064	0
$0.064 \times 2 \Rightarrow$	0.128	0
$0.128 \times 2 \Rightarrow$	0.256	0
$0.256 \times 2 \Rightarrow$	0.512	0
$0.512 \times 2 \Rightarrow$	1.024	1

• 01000001

part after the radix point

binary: 1001001011.01000001

we can convert binary form of 587.254 into hexadecimal

001001001011.01000001
2 4 B 4 1

hexadecimal: (24B.41)₁₆

we can convert binary form of 587.254 into octal

001001001011.010000010
1 1 1 3 2 0 2

Octal: (1113.202)₈

For given hexadecimal number DC12.45

Converting $DC12.45$ into binary number

1	→	0001
2	→	0010
4	→	0100
5	→	0101
C	→	1100
D	→	1101

binary: $1101110000010010.01000101$

Converting binary form of $DC12.45$ into decimal

$1101110000010010.$

Integer part

$$2^1 \times 1 + 2^4 \times 1 + 2^{10} \times 1 + 2^{11} \times 1 + 2^{12} \times 1 + 2^{14} \times 1 = 56338$$

For Fractional part

• 01000101

$$2^{-2} \times 1 + 2^{-6} \times 1 + 2^{-8} \times 1 = 0.269$$

decimal: 56338.269

Converting binary form of $DC12.45$ into octal

00110111000000010010 . 010001010
 1 5 6 0 2 2 2 1 2

Octal: 156022.212

converting octal number 452.32 into
binary equivalent

<u>Octal</u>		<u>binary</u>
2	→	010
3	→	011
4	→	100
5	→	101

binary: 100101010.011010

converting binary form of 452.32 into
hexadecimal

000100101010. 01101000
1 2 A b 8

hexadecimal: (12A.68)_h

converting binary form of 452.32
into decimal

100101010.

Integer part

$$2^1 \times 1 + 2^3 \times 1 + 2^5 \times 1 + 2^8 \times 1 = 298$$

• 011010

Fractional part

$$2^{-2} \times 1 + 2^{-3} \times 1 + 2^{-5} \times 1 = 0.40625$$

decimal: 298.40625

converting 111001.1001 into hexadecimal

$$\begin{array}{ccc} \underline{00111001} & . & \underline{1001} \\ 3 & & 9 \end{array}$$

hexadecimal: $(39.9)_h$

converting 111001.1001 into octal

$$\begin{array}{ccc} \underline{111001} & . & \underline{100100} \\ 7 & & 4 \end{array}$$

octal: $(71.44)_o$

converting 111001.1001 into decimal

$$\underline{111001} \cdot \text{Integer part}$$

$$2^0 \times 1 + 2^3 \times 1 + 2^4 \times 1 + 2^5 \times 1 = 57$$

$$\cdot \underline{1001}$$

Fractional part

$$2^{-1} \times 1 + 2^{-4} \times 1 = 0.5625$$

$$57 + 0.5625 = 57.5625$$

decimal: 57.5625

Question - 2) Original name: GOKAY

we will represent: GOKAY in ASCII

name: GOKAY

in decimal: 71 79 85 65 83

(5)

Character \in of Gokay

$$\begin{array}{r}
 2 \\
 \hline
 20 \\
 \hline
 1 \\
 \hline
 35 \\
 \hline
 17 \\
 \hline
 2 \\
 \hline
 16 \\
 \hline
 8 \\
 \hline
 0 \\
 \hline
 8 \\
 \hline
 4 \\
 \hline
 0 \\
 \hline
 2 \\
 \hline
 2 \\
 \hline
 0 \\
 \hline
 2 \\
 \hline
 0 \\
 \hline
 2 \\
 \hline
 0 \\
 \hline
 2 \\
 \hline
 0
 \end{array}$$

G in binary : 1000111

character O of GOKAY

$$\begin{array}{r}
 1 \overline{) 789} \quad 2 \\
 \underline{78} \\
 9 \\
 1 \overline{) 39} \quad 2 \\
 \underline{38} \\
 9 \\
 1 \overline{) 38} \quad 2 \\
 \underline{36} \\
 8 \\
 1 \overline{) 89} \quad 2 \\
 \underline{88} \\
 9 \\
 1 \overline{) 89} \quad 2 \\
 \underline{88} \\
 9 \\
 1 \overline{) 51} \quad 2 \\
 \underline{50} \\
 1 \\
 0 \overline{) 22} \quad 2 \\
 \underline{20} \\
 2 \\
 0 \overline{) 22} \quad 2 \\
 \underline{20} \\
 2 \\
 1 \overline{) 02} \quad 2 \\
 \underline{00} \\
 2 \\
 0 \overline{) 02} \quad 2 \\
 \underline{00} \\
 2
 \end{array}$$

0 in binary : 1001111

character k of $GOKAY$

Handwritten notes showing a sequence of numbers and operations, possibly related to the Fibonacci sequence:

75 | 2
25 | 17
1 | 16
1 | 15
0 | 14
1 | 13
1 | 12
0 | 11
1 | 10
1 | 9
0 | 8
1 | 7
1 | 6
0 | 5
1 | 4
1 | 3
0 | 2
1 | 1
0 | 0

K in binary: 1001011

character A of GOKAY

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

A in binary: 1000001

character Y of GOKAY

$$\begin{array}{r}
 85 \overline{) 2} \\
 \underline{-88} 44 2 \\
 44 2 \\
 22 2 \\
 22 11 2 \\
 11 5 2 \\
 5 2 2 \\
 4 2 2 \\
 2 1 2 \\
 1 0 0 \\
 0 0 0 \\
 1
 \end{array}$$

Y in binary: 1011001

character names in hexadecimal base are as follows

character G of GOKAY

$$\begin{array}{r}
 21 \overline{) 16} \\
 \underline{-64} 4 \\
 4
 \end{array}$$

G in hexadecimal: (47)_h

character O of GOKAY

$$\begin{array}{r|l} 79 & 16 \\ - 64 & 4 \\ \hline 15 & \end{array}$$

hexadecimal decimal
F → 15

O in hexadecimal: (4F)_h

character K of GOKAY

$$\begin{array}{r|l} 75 & 16 \\ - 64 & 4 \\ \hline 12 & \end{array}$$

hexadecimal decimal
B → 11

K in hexadecimal: (4B)_h

character A of GOKAY

$$\begin{array}{r|l} 65 & 16 \\ - 64 & 4 \\ \hline 1 & \end{array}$$

A in hexadecimal: (41)_h

character Y of GOKAY

$$\begin{array}{r|l} 89 & 16 \\ - 80 & 5 \\ \hline 9 & \end{array}$$

Y in hexadecimal: (59)_h

n name: GOKAY

in decimal: 71 79 75 65 89

name: GOKAY: (1000111) (1001111) (1001011) (1000001) (1011001)

in decimal: 71 79 75 65 89

in binary: (1000111) (1001111) (1001011) (1000001) (1011001)

Question 3-)

Addition

$$\begin{array}{r} 1111111 \\ 1110111 \\ + 1111111 \\ \hline 111101010 \end{array} \rightarrow \text{carries}$$

result: 111101010

Subtraction

$$\begin{array}{r} 1110111 \\ - 00011101 \\ \hline 11001110 \end{array}$$

result: 11001110

Multiplication

$$\begin{array}{r} 1101 \\ \times 11 \\ \hline 11101 \\ + 11010 \\ \hline 100111 \end{array}$$

result: 100111