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ASSIGNMENT :- 01.

Q 1] Convert the following numbers into their equivalent binary, hexadecimal and octal number.

i) 1102

a] To binary $(1102)_{10} = (\ )_2$

2	1102	0
2	551	1
2	275	1
2	137	1
2	68	0
2	34	0
2	17	1
2	8	0
2	4	0
2	2	0
1	1	1
	1	

$= (10001001110)_2$

b] To hexadecimal $(1102)_{10} = (\ )_{16}$

16	1102	14
16	68	4
	4	4

$= (44E)_{16}$

c] To octal number $(1102)_{10} = (\ )_8$.

8	1102	6
8	137	1
8	17	1
	2	2

$= (2116)_8$.

ii) 56.0286

a) To binary

2	56	0
2	28	0
2	14	0
2	7	1
2	3	1
	1	1

$0.0286 \times 2 = 0.0592$
$0.0592 \times 2 = 0.1144$
$0.1144 \times 2 = 0.2288$
$0.2288 \times 2 = 0.4576$

$= (111000.00001)_2$

b) To Hexadecimal

16	56	2
	3	3

$0.0286 \times 16 = 0.4576$
$0.4576 \times 16 = 7.3216$
$0.3216 \times 16 = 5.1456$
$0.1456 \times 16 = 2.3296$

$= (32.0752)_{16}$

c) To octal

8	58	0
	7	7

$0.0286 \times 8 = 0.2288$
$0.2288 \times 8 = 1.3304$
$0.3304 \times 8 = 6.6432$

$= (70.016)_8$

iii) 937

a) To binary

2	937	1
2	468	0
2	234	0
2	117	1
2	58	0
2	29	1
2	14	0
2	7	1
2	3	1
	1	1

$= (1110101001)_2$

b) To ~~hexadecimal~~ octal

8	937	1
8	117	5
8	14	6
	1	1

$= (1651)_8$

c) To hexadecimal

16	937	9
16	58	10
	3	3

$= (3A9)_{16}$

iv) 1.025

$(1)_2$

$0.025 \times 2 = 0.050$

$0.05 \times 2 = 0.1$

$0.1 \times 2 = 0.2$

$= (1.000)_2$

b) To octal

$= (1)_2$ ↑

$0.025 \times 8 = 0.200$

$0.2 \times 8 = 1.6$

$0.6 \times 8 = 4.8$

$0.8 \times 8 = 6.4$ ↓

$= (1.0146)_8$

c) To hexadecimal

$= (1)_{16}$

$0.025 \times 16 = 0.4$

$0.4 \times 16 = 6.4$

$0.4 \times 16 = 6.4$

$= (1.066)_{16}$

v) $(456)_{10}$

a) To binary

2	456	0
2	228	0
2	114	0
2	57	1
2	28	0
2	14	0
2	7	1
2	3	1
	1	1

$= (111001000)_2$

b) To hexadecimal

16	456	8
16	28	12
	1	

$= (218)_{16}$

c] To octal

8	456	0
8	57	1
	7	7

$= (710)_8$

vi) $(25.55)_{10}$

a] To binary.

2	25	1
2	12	0
2	6	0
2	3	1
	1	1

$0.55 \times 2 = 1.1$
$0.1 \times 2 = 0.2$
$0.2 \times 2 = 0.4$
$0.4 \times 2 = 0.8$
$0.8 \times 2 = 1.6$

$= (11001.10001)_2$.

b) To octal

8	25	1
	3	3

$0.55 \times 8 = 4.4$
$0.4 \times 8 = 3.2$
$0.2 \times 8 = 1.6$
$0.6 \times 8 = 4.8$

$= (31.4314)_8$.

c) To hexadecimal

16	25	9
	1	1

$0.55 \times 16 = 8.8$
$0.8 \times 16 = 12.8$
$0.8 \times 16 = 12.8$

$= (19.8C2)_{16}$

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Q2] Convert the following hexadecimal numbers into their equivalent octal, binary, and decimal numbers.

i) $(A72E)_{16}$

a) To binary:

$(1010\ 0111\ 0010\ 1110)_2$

b) To octal number: ($2^3 = 8$: 3 bit)

$$\underline{001}\ \underline{010}\ \underline{011}\ \underline{100}\ \underline{101}\ \underline{110}$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6$$

$$= (123456)_8.$$

c) To decimal number:

$$= A \times 16^3 + 7 \times 16^2 + 2 \times 16^1 + E \times 16^0$$

$$= (10 \times 4096 + 7 \times 256 + 32 + 14 \times 1)$$

$$= (42798)_{10}.$$

ii) $(0.BF85)_{16}$

a) To binary:

$(0.1011\ 1111\ 1000\ 0101)_2$

b) To octal number: ($2^3 = 8$: 3 bit)

$$0.\ \underline{101}\ \underline{111}\ \underline{111}\ \underline{000}\ \underline{010}\ \underline{100}$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$5 \quad 7 \quad 7 \quad 0 \quad 2 \quad 4$$

$$= (0.577024)_8.$$

c] To decimal number:

$= 0.0 + B \times 16^{-1} + F \times 16^{-2} + 8 \times 16^{-3} + 5 \times 16^{-4}$

$= 0.0 + 11 \times 16^{-1} + 15 \times 16^{-2} + 8 \times 16^{-3} + 5 \times 16^{-4}$

$= (0.7481231689)_{10}$

iii) $(4A)_{16}$

a] To binary number:

$(01001010)_2$

b] To octal number: ($2^3 = 8$: 3 bit)

$\underline{00}\,\underline{100}\,\underline{1010}$

$\downarrow \quad \downarrow \quad \downarrow$

$1 \quad 1 \quad 2$

$= (112)_8$

c] To decimal number:

$= 4 \times 16^1 + A \times 16^0$

$= 4 \times 16 + 10 \times 1$

$= 74$

$= (74)_{10}$

iv) $(2E)_{16}$

a] To decimal number:

$(0010\ 1110)_2$

b] To octal number: ($2^3 = 8$: 3 bit)

$\underline{00}\,\underline{010}\,\underline{111}\,\underline{0}$

$\downarrow \quad \downarrow \quad \downarrow$

$0 \quad 5 \quad 6$

$= (056)_8$

c] To decimal number:

$= 2 \times 16^1 + E \times 16^0$

$= 32 + 14$

$= (46)_{10}$

Q3] Convert the following octal numbers into their equivalent hexadecimal, binary and decimal numbers.

i] $(127)_8$

a) To binary number:

2	127	1
2	63	1
2	31	1
2	15	1
2	7	1
2	3	1
	1	1

$= (1111111)_2$

b) To hexadecimal number:

$0111\ 1111$

$\downarrow \quad \downarrow$

$7 \quad 15$

$= (715)_{16}$

ii) $(0.3467)_8$

a) To binary number:

$(0.011100111111)_2$

b) To hexadecimal number:

$(0.0111\ 0011\ 1111)$

$= (0.737)_{16}$

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Q4] 2's complement representation

i) $9 - 8 = 1$

$(9)_{10} = (1001)_2$

$(8)_{10} = (1000)_2 \xrightarrow{\text{1's complement}} (0111)$

$\downarrow$ 2's complement

$$\begin{array}{r} 0111 \\ +\quad 1 \\ \hline 1000 \end{array}$$

$\therefore$
$$\begin{array}{r} 1001 \\ +\ 1000 \\ \hline \boxed{1}0001 \end{array}$$

carry will be dropped

$\therefore (0001)_2 = 1.$

ii) $7 - 5 = 2$

$(7)_{10} = (111)_2$

$(5)_{10} = (101)_2 \xrightarrow{\text{1's complement}} (010)$

$\downarrow$ 2's complement.

$$\begin{array}{r} 010 \\ +\quad 1 \\ \hline 011. \end{array}$$

$$\begin{array}{r} 1\ 1\ 1 \\ +\ 0\ 1\ 1 \\ \hline \boxed{1}\ 0\ 1\ 0 \end{array}$$

carry will be dropped.

$(010)_2 = (2)$

iii) $5 - 7 = -2$.

$(5)_{10} = (101)_2$

$(7)_{10} = (111)_2 \xrightarrow{1\text{'s complement}} (000)$

$\downarrow$ 2's complement

$$\begin{array}{r} 000 \\ +\ \ \ 1 \\ \hline 001. \end{array}$$

$$\begin{array}{r} 101 \\ +\ 001 \\ \hline 110 \end{array}$$

Since no carry is generated, it will remain as it was, but it is in 2's complement and negative.

$\therefore (110) \longrightarrow -(010) = -2$.