

University of engineering & technology Peshawar



Digital logic and Computer design -theory

Assignment no#01

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Section: B

Reg No: 19PWCSE1795

Semester: 3nd

“On my honor, as a student of University of Engineering and Technology Peshawar, I have neither given nor received unauthorized assistance on this academic work”

Student signature: _____

**Submitted to:
Prof: Rahmat Sab**

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Date: 26 11 2020

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Q2:

Convert $(1278.875)_{10}$ to

i, Base 16

ii, Base 8

iii, Base 2

iv, Base 7

v, Base 3

Answer:

$$(i) (1278.875)_{10} = (?)_{16}$$

To convert $(1278.875)_{10}$ to Base - 16

first we convert its integer part to
Hexadecimal by dividing 16. i.e

$$\begin{array}{r} 1278 \\ \hline 79 & 14 \\ \hline 4 & 15 \\ \hline 0 & 4 \end{array}$$

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Now $(1278)_{10} = (041514)_{16}$

As in Base-16 $14 = E$ & $15 = F$ So

$$(1278)_{10} = (04FE)_{16}$$

Now we convert decimal part,

$$0.875 \times 16 = 14 = (E)_{16}$$

thus $(1278.875)_{10} = (4FE.E)_{16}$

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(ii) Base 8

$$(1278.875)_{10} = (?)_8$$

first divide integer part by 8

1278	
159	6
19	7
2	3

$$(1278)_{10} = (2376)_8$$

Now take decimal part

$$0.875 \times 8 = 7$$

thus

$$(1278.875)_{10} = (2376.7)_8$$

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(3)

(iii) Base 2:

$$(1278.875)_{10} = (?)_2$$

Take integer part $\frac{1278}{2}$

$$\begin{array}{r} 1278 \\ \hline 639 & 0 \\ \hline 319 & 1 \\ \hline 159 & 1 \\ \hline 39 & 1 \\ \hline 19 & 1 \\ \hline 9 & 1 \\ \hline 4 & 1 \\ \hline 2 & 0 \\ \hline 1 & 0 \end{array}$$

$$(1278)_{10} = (10011110)_2$$

Now take decimal part

$$\begin{array}{r} 2 \times 0.875 \\ \hline 2 \times 0.75 & 1 \\ \hline 2 \times 0.5 & 1 \\ \hline & 1 \end{array}$$

thus

$$(1278.875)_{10} = (10011110.111)_2$$

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(iv) Base 7

$$(1278.875)_{10} = (?)_7$$

Take integer part & "divide" by 7

$$\begin{array}{r} 1278 \\ \hline 182 | 4 \\ \hline 26 | 0 \\ \hline 3 | 5 \\ \hline \end{array}$$

$$(1278)_{10} = (3504)_7$$

Now take decimal part & "times" by 7

$$\begin{array}{r} 7 \times 0.875 \\ \hline 7 \times 0.125 | 6 \\ \hline 7 \times 0.875 | 0 \\ \hline 0.125 | 6 \\ \hline \end{array}$$

$$\text{So } (0.875)_{10} = (606)_7$$

Hence

$$(1278.875)_{10} = (3504.606)_7 \quad \underline{\text{Ans}}$$

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(v) Base 3:

$$(1278.875)_{10} = (?)_3$$

Take integer part

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$$\begin{array}{r}
 1278 \\
 \hline
 426 \quad 0 \\
 \hline
 142 \quad 6 \\
 \hline
 47 \quad 1 \\
 \hline
 15 \quad 3 \\
 \hline
 5 \quad 0 \\
 \hline
 1 \quad 2
 \end{array}$$

$$(1278)_{10} = (1202100)_3$$

Now take decimal part.

$$\begin{array}{r}
 3 \times 0.875 \\
 \hline
 3 \times 0.625 \quad 2 \\
 \hline
 3 \times 0.875 \quad 1 \\
 \hline
 0.625 \quad 2
 \end{array}$$

$$\Rightarrow (0.875)_{10} = (212)_3$$

thus

$$(1278.875)_{10} = (1202100.212)_3 \text{ Ans}$$

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Q3: Find Base 10 of the following.

$$(i) (3F1B.25)_{16}$$

$$(3F1B.25)_{16} = (?)_{10}$$

First write 3F1B.25 in the form 3|5|1|1.25

Now multiply each number by the power of 16. Finally add them.

$$\begin{aligned} & 3 \times 16^3 + 15 \times 16^2 + 1 \times 16^1 + 11 \times 16^0 + 2 \times 16^{-1} + 5 \times 16^{-2} \\ & 12288 + 3840 + 16 + 11 + 0.125 + 0.01953125 \\ & = 16155.14453125 \end{aligned}$$

Thus,

$$(3F1B.25)_{16} = (16155.14453125)_{10} \text{ Ans}$$

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$$(ii) (456723.75)_8$$

$$\underline{\text{Solved}} \quad (456723.75)_8 = (?)_{10}$$

To convert decimal multiply each no by power of the base 8.

$$4 \times 8^5 + 5 \times 8^4 + 6 \times 8^3 + 7 \times 8^2 + 2 \times 8^1 + 3 \times 8^0$$

$$+ 7 \times 8^{-1} + 5 \times 8^{-2}$$

$$131072 + 20480 + 3072 + 448 + 3 + 0.875$$

$$+ 0.078125$$

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$$= 155091.953125$$

Thus

$$(456723.75)_8 = (155091.953125)_{10}$$

— xx — xx — xx — xx

$$(101110001110101.10011)_2$$

Sol

$$(101110001110101.10011)_2 = (?)_{10}$$

To convert above we use following procedure.

$$\begin{aligned}
 & 1 \times 2^{15} + 0 \times 2^{14} + 1 \times 2^{13} + 1 \times 2^{12} + 1 \times 2^{11} + 1 \times 2^{10} + 0 \times 2^9 + 0 \times 2^8 \\
 & + 0 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 \\
 & 1 \times 2^0 + 1 \times 2^{-1} + 0 \times 2^{-2} + 0 \times 2^{-3} + 1 \times 2^{-4} + 1 \times 2^{-5} \\
 & 32768 + 8192 + 4096 + 2048 + 1024 \\
 & + 64 + 32 + 16 + 4 + 1 + 0.5 + 0.0625 \\
 & + 0.03125 = 48245.59375
 \end{aligned}$$

Thus

$$(101110001110101.10011)_2 = (48245.59375)_{10}$$

Ans

$$— xx — xx — xx — xx$$

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(iv) $(31242 \cdot 2314)_5$

Sol

$$(31242 \cdot 2314)_5 = (?)_{10}$$

we use given procedure

$$\begin{aligned} & 3 \times 5^4 + 1 \times 5^3 + 2 \times 5^2 + 4 \times 5^1 + 2 \times 5^0 + 2 \times 5^{-4} \\ & + 3 \times 5^{-3} + 1 \times 5^{-2} + 4 \times 5^{-4} \end{aligned}$$

$$\begin{aligned} & 1875 + 125 + 50 + 20 + 2 + 0.4 + 0.12 \\ & = (2072.52)_{10} \end{aligned}$$

Thus

$$(31242 \cdot 2314)_5 = (2072.52)_{10} \text{ Ans}$$

(v) $(31242 \cdot 60)_7$

Sol

$$(31242 \cdot 60)_7 = (?)_{10}$$

$$\begin{aligned} & 3 \times 7^4 + 1 \times 7^3 + 2 \times 7^2 + 4 \times 7^1 + 2 \times 7^0 + 6 \times 7^{-1} \\ & + 0 \times 7^{-2} \\ & 7203 + 343 + 98 + 4 + 2 + 0.857142857 \\ & = (7650.857148571) \end{aligned}$$

Thus

$$(31242 \cdot 60)_7 = (7650.857148571)_{10}$$

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Q4: Convert the following number directly to binary without using any intermediary base.

$$i) (3E89.AC27)_{16}$$

Sol

without using any intermediary base we will use given table.

binary	Hexadecimal
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

From above table :

$$(3E89.AC27)_{16} = (11111010001001.1010110000100111)_{2}$$

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(ii) $(22144.3561)_8$

Sep

Conversion of octal to binary
without using any intermediate base
we will use table of 3 binary digit

Binary	Octal
0 0 0	0
0 0 1	1
0 1 0	2
0 1 1	3
1 0 0	4
1 0 1	5
1 1 0	6
1 1 1	7

by using above table, we get -

$$(22144.3561)_8 = (10010001100100 \cdot 01110111001)_2$$

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Q5: Convert $(110011011001010.1011101)_2$ to octal.

Sol = In case of conversion from binary to octal, we make the group of 3-digits from right side for integral part and from left side for decimal part.

i.e

$\overline{001} \overline{100} \overline{110} \overline{111} \overline{001} \cdot \overline{010} \cdot \overline{101} \overline{110} \overline{100}$

Now try using octa-binary table as we made it in Q4-(ii).

$$(110011011001010.1011101)_2 = (146712.564)_8 \text{ Ans}$$

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Ques: Write first twenty decimal numbers in base 2.

Sep

Decimal	Binary
1	1
2	10 $1+1 = 10$
3	11 $10+1 = 11$
4	100 $11+1 = 100$
5	101 $100+1 = 101$
6	110 $101+1 = 110$
7	111 $110+1 = 111$
8	1000 $111+1 = 1000$
9	1001 $1000+1 = 1001$
10	1010 $1001+1 = 1010$
11	1011 $1010+1 = 1011$
12	1100 $1011+1 = 1100$
13	1101 $1100+1 = 1101$
14	1110 $1101+1 = 1110$
15	1111 $1110+1 = 1111$
16	10000 $1111+1 = 10000$
17	10001 $10000+1 = 10001$
18	10010 $10001+1 = 10010$
19	10011 $10010+1 = 10011$
20	10100 $10011+1 = 10100$

xx ————— xx ————— xx ————— xx
 the END