Number system

+ Binary to decimal = ×2

Binary to octal

001 101 101 · 101 100

Octal equivalent of Binary value

0 0 1	101	100
4 2 1	421	421

now representing above binary value into octal

$$(001101101.101100)_2 = (155.54)_8$$

Binary to Hexadecimal

A = 10, B = 11, C = 12, D = 13
E = 14, F = 15

0010 1101 . 1011 1000

8 4 2 1
0 0 1 0 → 2
1 1 0 1 → 8+4+1 = 13 = D
1 0 1 1 → B
1 0 0 0 → 8

$$(00101101.10111000)_2 = (2D.B8)_{16}$$

1011011.11010110
converting into decimal

$= 1\times2^6 + 0\times2^5 + 1\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 1\times2^0 + 1\times2^{-1} + 1\times2^{-2} + 0\times2^{-3} + 1\times2^{-4} + 0\times2^{-5} + 1\times2^{-6} + 1\times2^{-7} + 0\times2^{-8}$

$= 64 + 0 + 16 + 8 + 0 + 2 + 1 + 1/2 + 1/4 + 0 + 1/16 + 0 + 1/64 + 0 + 1/256$

$= 91.769$

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Converting into octal

001011011.110101100

4	2	1	
0	0	1	→ 1
0	1	1	→ 3
1	1	0	→ 6
1	0	1	→ 5
1	0	0	→ 4

001 → 1
011 → 3
110 → 6
101 → 5
100 → 4

now, representing above binary into octal

$(001011011.110101100)_2 = (133.654)_8$

Hexadecimal

01011011.11010110

0101	1011	1101	0110
8421	8421	8421	8421
5	11 → B	13 → D	6

now, representing above binary into hexadecimal.

$(1011011.11010110)_2 = (5B.D6)_{16}$

* $(567.346)_8 = ( )_{16}$

converting octal into binary

5	6	7	3	4	6
421	421	421	421	421	421
101	110	111	011	100	110

Here,

$(567.346)_8 (101110111.011100110)_2$

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now,

0001   0111   0011
8421   8421   8421
7   7   3

Representing binary into hexadecimal

$(10111011 1.01110011 0)_2 = (177.73)_{16}$
$(567.346)_8 = (177.73)_{16}$

+ $(BfA.9BC)_{16} = (\ \ )_8$

B   f   A
11   15   10
8421   8421   8421
1011   1111   1010

9   B   C
8421   8421   8421
1001   1011   1100

Here, $(BfA.9BC)_{16} = (1011\ 1111\ 1010 . 100110111100)_2$
converting binary into octal

101   111   101   100   110
421.   421   421   421   421
5   7   6   4   6

now,

Representing binary value into octal
$(101111\ 101\ 101.\ 100\ 110\ 111\ 100)_2 = (5772.4674)_8$
$(BfA.9BC)_{16} = (5772.4674)_8$

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Decimal to Binary

$(986.625) - (\ )_2$

Sol:

$$\begin{array}{r|l}
2 & 986 \to 0 \\
2 & 493 \to 1 \\
2 & 246 \to 0 \\
2 & 123 - 1 \\
2 & 61 - 1 \\
2 & 30 - 0 \\
2 & 15 - 1 \\
2 & 7 - 1 \\
2 & 3 - 1 \\
 & 1
\end{array}$$

Decimal value	operational value	Result	integer
0.625	0.625×2	1.25	1
0.25	0.25×2	0.5	0
0.5	0.5×2	1.0	1

$(986.625)_{10} = (1111011010)_2$

decimal into octal

986.625

$$\begin{array}{r|l}
8 & 986 - 2 \\
8 & 123 - 3 \\
8 & 15 - 7 \\
 & 1
\end{array}$$

Decimal value	operation value	Result	integer
0.625	0.625×8	5	5

$(986.625)_{10} - (1732.5)_8$

Decimal to Hexadecimal

$$
\begin{array}{r|l}
16 & 986 - 10 \\
16 & 61 - 13 \\
 & 3
\end{array}
$$

Decimal value	operational value	Result	integer
0.625	0.625×16	10	A

$(986.625) = (3DA.A)_{16}$

* $(735.674)_8 = (\ \ )_{10}$

Sol)

$= 7\times8 + 3\times8 + 5\times8^0 + 6\times8^{-1} + 7\times8^{-2} + 4\times8^{-3}$

$= 448 + 24 + 5 + 6/8 + 7/64 + 4/512$

$= 477 + 0.75 + 0.10 + 0.0078$

$= 477.85$

* $(AC9.DB)_{16} = (?)_{10}$

A=10

C=12

9

D=15

B=12

Here,

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$10\times16^{2}+12\times16^{1}+9\times16^{0}+15\times16^{-1}+12\times16^{-2}$

$= 2560+192+9+15/16+12/256$

$= 2761+0.9375+0.046$

$= 2761.9835$

1's complement

1011 − 0101

1's complement of 0101 = 1010,
Adding it with 1011 =

$$\begin{array}{r} 1010 \\ 1011 \\ \hline 10101 \end{array}$$

So, removing the carry and adding it with remaining.

$$\begin{array}{r} 0101 \\ +1 \\ \hline 0110 \end{array}$$

∴ Difference is $(0110)_2$

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Substract 1011 from 0101

1's complement of 1011 = 0100

Adding it with 0101 =

$$\begin{array}{r} 0100 \\ 0101 \\ \hline 1001 \end{array}$$

now, We donot have extra bit,

So

difference = 1's complement of result

= -(0110)

+ 1011.010 - 1000.101

Sol's

1's complement of 1000.101 = 0111.010

Adding it with 1011.010 =

$$\begin{array}{r} 0111.010 \\ 1011.010 \\ \hline 10010.100 \end{array}$$

So, removing the carry and add it with remaining

$$\begin{array}{r} 0010.100 \\ 1 \\ \hline 0010.101 \end{array}$$

Difference is $(0010.101)_2$

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~~1's~~ 1's complement of 1011.010 0100.101

Adding it with 1000.101

$$\begin{array}{r} 0100.101 \\ 1000.101 \\ \hline 1101.010 \end{array}$$

Here, we donot have extra bit,
Hence

Difference = $-$1's complement of result
= $-$(0010.101)

1011 - 0101

1's component of 0101 = 1010
2's Component of 0101 = 1010

$$\begin{array}{r} 1010 \\ +1 \\ \hline 1011 \end{array}$$

Adding it with 1011.

$$\begin{array}{r} 1011 \\ 1011 \\ \hline 10110 \end{array}$$

Here we have carry so removing the carry
Difference is 0110

1) 1011.010
1000.101

Sol^n

1's component of 1000.101 = 0111.010
2's component of 1000.101 = 0111.010

$$\begin{array}{r} 0111.010 \\ +1 \\ \hline 0111.011 \end{array}$$

Adding it with 1011.010 =

$$\begin{array}{r} 0111.011 \\ 1011.010 \\ \hline 10010.101 \end{array}$$

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so removing the extra bit and difference is 0010.101

1s component of 1011.010 = 0100.101
2's component of 1011.010 = 0100.101

$$
\begin{array}{r}
0100.101 \\
+1 \\
\hline
0100.110
\end{array}
$$

Adding it with 1000.101

$$
\begin{array}{r}
0100.110 \\
1000.101 \\
\hline
1101.011
\end{array}
$$

Here We don't have extra bit
So,

Different = − 2's complement
= − (1101.011)

101.11 − 100.01

Sol:

1's complement of 100.01 = 011.10

Adding it with 101.11

$$
\begin{array}{r}
011.10 \\
101.11 \\
\hline
1001.01
\end{array}
$$

So removing extra bit and adding with remaining

$$
\begin{array}{r}
001.01 \\
+1 \\
\hline
001.10
\end{array}
$$

Difference $= (001.10)_2$

101.11 − 100.01

1's complement	=	0 11.10
2's Complement	=	0 11.10
		+1
		011.11

Adding it with 101.11

$$\begin{array}{r} 011.11 \\ 101.11 \\ \hline 1001.10 \end{array}$$

So removing the extra bit and difference is

001.10.

+ 100.01 - 101.11

Sol

1's complement of 101.11 = 010.11

Adding it with 100.01 =

$$\begin{array}{r} 010.11 \\ 100.01 \\ \hline 111.00 \end{array}$$

Here we don't have extra bit

Here, Difference = - 1's complement of result

= $-(000.11)_2$

1010.110 - 1100.101

Soln

1st complement of 1100.101 = 0011.010

Adding it with 1010.110 =

$$\begin{array}{r} 0011.010 \\ 1010.110 \\ \hline 1110.000 \end{array}$$

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We don't have extra bit
Hence, difference = − 1's complement of result
$= -(0001.111)_2$

1's complement of 1100.101 = 011.010
2's complement of 0011.010 = 0011.010
+1
0011.011

Adding it with 1010.110 = 0011.011
1010.110
1110.001

We don't have extra bit
1's component = 0001.110
2's Component 0001.110
+1
0001.111

For + value 1 write the binary value of it
+8 = 1000

Add 0 in remaining slot to make it of 8 bit
for − value (1) write the binary of it.
−8 − 1000
1's complement 0111
2's Complement 0111
+1
1000

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Add 1 remaining slot to make it of 8 bit

-8 = 11111000

	sign	operation
[+] + [+] =	+	+
[+] + [-] =	greater	−
[-] + [+] =	greater	−
[-] + [-] =	−	+

A = 8
B = 12
Sol)

A + B = (+8) + (+12)
Binary value of 8 = 1000
Making it of 8 bit = 0001000

Binary value of 12 = 1100
Making it of 8 bit = 0001100
now,

(+A) = (+8) = 0001000
(+B) = (+12) = 0001100
000 10100

A - B = (+A) + (-B)
Binary value of 8 = 1000
Making it of 8 bit = 000 1000
Binary value of 12 = 1100
1's complement = 0011
2's complement 0011
+1
0100

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Making it 8 bit = 11110100

now,

$$\begin{array}{lrr} (+A) = (+8) & = & 00001000 \\ (-B) \quad (-12) & & 11110100 \\ \hline \quad -4 & & 11111100 \end{array}$$

1's component of result 00000011

$$\begin{array}{r} 00000011 \\ +1 \\ \hline 00000100 \end{array}$$

* A-B = -4

-A +B = (-A) + (+B)

Binary value of 8 = 1000

1's component = 0111

2's component = 0111

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

Making it 8 bit = 11111000

Binary value of 12 = 1100

Making it 8 bit = 0000 1100

now,

$$\begin{array}{lrr} (-A) = -8 & = & 11111000 \\ (+B) = +12 & & 00001100 \\ \hline \quad +4 & & 100000100 \end{array}$$

Here, neglect the carry -A + B = +4

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$-A - B$

Sol^n

$(-A) + (-B)$

Binary value of 12 = 1100

1's complement = 0011

2's complement = 0011

$$\begin{array}{r} 0011 \\ +1 \\ \hline 0100 \end{array}$$

Making it of 8 bit 11111000

Binary value of 12 = 1100

1's complement 0011

2's Complement

$$\begin{array}{r} 0011 \\ +1 \\ \hline 0100 \end{array}$$

Making it of 8 bit = 11110100

now,

$(-A) = -8 =$ 11111000

$(-B) = -12$ 11110100

$$\begin{array}{r} 11111000 \\ 11110100 \\ \hline 111101100 \end{array}$$

neglect the carry and

1's complement 00010011

2's Complement 00010011

$$\begin{array}{r} 00010011 \\ +1 \\ \hline 00010100 \end{array}$$

$(-A) + (-B) = -20$ (10100)

BCD

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- 54+65

BCD of 54 = 0101 0100

BCD of 65 = 0110 0101

119

1011 1001

+0110

00010001 1001

- 33+79

BCD value of	33	0011	0011
	79	0111	1001
	112	1010	1100
		0110	0110
		00010001	0010

Exclusive OR

0.0 = 0

1.1 = 0

0.1 = 1

1.0 = 1

1.1.0 110 11

↓

1 0 1 1 0 1 1 0

↓

1 1 0 1 1 0 1 1

Digital	Binary	Gray	BCD
1	0001	0001	0001
2	0010	0011	0010
3	0011	0010	0011
4	0100	0110	0100
5	0101	0111	0101
6	0110	0101	0110
7	0111	0100	0111
8	1000	1100	1000
9	1001	1101	1001
10	1010	1111	00010000
11	1011	1110	00010001
12	1100	1010	00010010
13	1101	1011	00010011
14	1110	1001	00010100
15	1111	1000	00010101

Binary coded decimal: BCD is a type of binary representation for decimal value where each digit is represented a fixed numbee of bits usually between four and eight

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Q. Write difference between Analog signal & digital signal.

Analog signal	digital signal
i. Analog signal are difficult to get analysed at first.	Digital signal are easy to analyses.
ii It is more accurate than digital	It is less accurate
iii It produce too much noise	It do not produce noise
iv It take time to stored. It has infinite memory	It can be easily stored.
v. There is a continuous representation of signal	There is a discontinuous repr-esentation of signal.

Q. Substract as indicate

1011.101 from 101.1010

Soln:

1's complement of 1011.101 = 0100.0101

2's complement of 0100.0101

```
  0100.0101
     0.0101
  ---------
  0100.0110
```

Adding it with 0101.1010 = ~~0101.1010~~

```
  0100.0110
  0101.1010
  ---------
  1010.0000
```

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Hence, there is no extra bit

1's complement of ~~rez~~ 0101.1111

2's complement 0101.1111

$$\begin{array}{r} 0101.1111 \\ +1 \\ \hline 0110.0000 \end{array}$$

ii 1100.110 from 11100.1011

Sol^n

1's Complement 01100.1100 = 10011.0011

~~2's Complement~~ Add it with 11100.1011

$$\begin{array}{r} 10011.0011 \\ 11100.1011 \\ \hline 101111.1110 \end{array}$$

So remaing extra bit and ~~edit~~ add it with remaining.

$$\begin{array}{r} 0\,1111.1110 \\ +1 \\ \hline 0\,1111.1111 \end{array}$$

Difference $-(01111.1111)_2$

- Gray Code:

A Gray code is an encoding of numbers so that adjacent numbers have a single digit differing by 1.

Binary to Gray code

10110

1 $\xrightarrow{+}$ 0 $\xrightarrow{+}$ 1 $\xrightarrow{+}$ 1 $\xrightarrow{+}$ 0

↓ ↓ ↓ ↓ ↓

1 1 1 0 1 → Gray

Gray to binary

10101111

1 0 1 0 1 1 1 1

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

1 1 0 0 1 0 1 0

- Excess-3 Code:

The excess-3 code is an non-weighted code used to express ~~code~~ decimal numbers. It is self complementary BCD code and numerical system which has biased representation.

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- EBCDIC
Extended Binary coded Decimal Interchange code is an 8 bit character - coding scheme used primarily on IBM computer.

- American standard code for information interchange.
ASCII is a 7-bit code, which means that only 128 character i.e 2^7 can be represented. It is a very well known fact that computer can manage internally only 0s and 1s. In ASCII "A" is represented by 65.

for example
65 = ~~10~~ 1000001 = A
B = 65 + 1
d = 65 + 25 + 4 = 94

EBf
65 + 4 = 69
65 + 1 = 66
65 + 5 = 70

Error Detection Code

Even parity → If message have 1 even then add 0 infront of MSB

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If message have 1 odd then add 1 infront of Msg.

e.g: 10110 → odd 1
parity = 110110

101101 → even 1
parity 0 = 0101101

Odd parity: If you have odd no of 1, you need to add 0 as parity.

If you have even no of 1 you need to add 1 as parity.

1. Perform binary into decimal

a. $101_2 = N_{10}$

Soln

$1\times2^2 + 0\times2^1 + 1\times2^0$

$4 + 1 = 5$

b. $11001_2 = N_{10}$

Soln

$1\times2^4 + 1\times2^3 + 0\times2^2 + 0\times2^1 + 1\times2^0$

$16 + 8 + 1 = 25$

c. $1111_2 = N_{10}$

Soln

$= 1\times2^3 + 1\times2^2 + 1\times2^1 + 1\times2^0$

$= 8 + 4 + 2 + 1 = 15$

d. $10011011_2 = N_{10}$

Soln

$1\times2^7 + 0\times2^6 + 0\times2^5 + 1\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 1\times2^0$

$128 + 16 + 8 + 2 + 1 = 155$

e. $10101_2 = N_{10}$

$1\times2^4 + 0\times2^3 + 1\times2^2 + 0\times2^1 + 1\times2^0$

$16 + 4 + 1 = 21$

f. $101101_2 = N_{10}$

$1\times2^5 + 0\times2^4 + 1\times2^3 + 1\times2^2 + 0\times2^1 + 1\times2^0$

$32 + 8 + 4 + 1 = 45$

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g. $1111110_2 = N_{10}$

soln

$= 1\times2^7 + 1\times2^6 + 1\times2^5 + 1\times2^4 + 1\times2^3 + 1\times2^2 + 1\times2^1 + 0\times2^0$

$= 128 + 64 + 32 + 16 + 8 + 4 + 2 = 222$

2. Convert the following binary into decimal equivalent

a. 100001

soln

$1\times2^5 + 0\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 1\times2^0$

$32 + 1 = 35$

b. 101101101

soln

1	0	1	1	0	1	1	0	1
256	128	64	32	16	8	4	2	1

$= 256 + 64 + 32 + 8 + 4 + 1 = 365$

c. 111111

soln

1	1	1	1	1	1
32	16	8	4	2	1

$= 32 + 16 + 8 + 4 + \cancel{*}2 + 1 = 63$

d. 11110000

Sol)

1	1	1	1	0	0	0	0
=128	64	32	16	8	4	2	1

$= 128 + 64 + 32 + 16 = 240$

3. Converting decimal into binary

a. $225_{10} = N_2$

Sol)

2	225	1
2	112	0
2	56	0
2	28	0
2	14	0
2	7	1
2	3	1
	1	

$225_{10} = (11100001)_2$

b. $129_{10} = N_2$

Sol)

2	129	1
2	64	0
2	32	0
2	16	0
2	8	0
2	4	0
2	2	0
	1	

$129_{10} = (100000101)_2$

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c. $670_{10} = N_2$

Sol)

2	670	0
2	335	1
2	167	1
2	83	1
2	41	1
2	20	0
2	10	0
2	5	1
2	2	0
	1	

$(670)_{10} = (1010011110)_2$

d. $(5634)_{10} = N_2$

Sol)

2	5634	0
2	2817	1
2	1408	0.
2	704	0.
2	352	0.
2	176	0.
2	88	0
2	44	0.
2	22	0
2	11	1
2	5	1
2	2	0
	1	

$(5634)_{10} = (101\cancel{1}000000010)_2$

4. Convert octal into hexadecimal

a. 6.

Sol

Converting octal into binary

6 - 4 2 1
1 1 0

now, representing value in binary

$(6)_8 = (110)_2$

again,

Converting binary into hexadecimal

0 1 1 0
8 4 2 1
6

Here, representing value into hexa

$(6)_8 = (6)_{16}$

b. 12

Sol

Converting octal into binary

2	12	0
2	6	0
2	3	1
	1	

now, representing value in binary

$(12)_8 = (1100)_2$

A = 10
B - 11
C

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Converting ~~into~~ binary into hexa:

~~1100~~ 1 1 0 0
~~8 4 2~~ 8 4 2 1 = 12 = C

c. 555
Sol'n

Converting octal into binary

2	555	1
2	277	1
2	138	0
2	69	1
2	34	1
2	17	1
2	8	0
2	4	0
2	2	0
	1	

$(555)_8 - (1000111011)_2$

Converting binary into hexa

0010 0011 1011
8421 8421 8421

23B

Now representing value in hexa

$(555)_8 = (23B)_{16}$

A = 10
B = 11
C = 12
D = 13
E = 14
F = 15

d. 123456

Sol:

Converting octal into binary

2	123456	0
2	61728	0
2	30864	0
2	15432	0
2	7716	0
2	3858	0
2	1929	1
2	964	0
2	482	0
2	241	1
2	120	0
2	60	0
2	30	0
2	15	1
2	7	1
2	3	1
	1	

$(123456)_8 = (11110001001000000)_2$

Converting binary into hexa

0001	1110	0010	0100	0000
8421	8421	8421	8421	8421
1	14=E	2	4	0

now, representing value in hexa

$(123456)_8 = (1E240)_{16}$

5. Convert hexadecimal into decimal

a. AA

sol^n

A = 10

A = 10

$= 1\times16^{3} + 0\times16^{2} + 1\times16^{1} + 0\times16^{0}$

$= 4096 + 16 + 1$

$= 4113$

b. FEDCBA

sol^n

F = 15

E = 14

D = 13

C = 12

B = 11

A 10

now,

$F\times16^{5} + E\times16^{4} + D\times16^{3} + C\times16^{2} + B\times16^{1} + A\times16^{0}$

$= 15\times16^{5} + 14\times16^{4} + 13\times16^{3} + 12\times16^{2} + 11\times16^{1} + 10\times16^{0}$

$= \cancel{15\times}\ 16702650$

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c BABE

Soln

$B = 11$

$A = 10$

$B = 11$

$E = 14$

now,

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

$= 11 \times 16^3 + 10 \times 16^2 + 11 \times 16^1 + 14 \times 16^0$

$= 47806$

d. FFFFFFFA

Soln

$F = 15$

$A = 10$

$15 \times 16^7 + 15 \times 16^6 + 15 \times 16^5 + 15 \times 16^4 + 15 \times 16^3 + 15 \times 16^2 + 15 \times 16^1 +$
10×16^0

$= 4294967295$

6. Convert the following octal into decimal:

a 5

5×8^0

$= 5$

b. 9

9×8^0

9

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c. 777

Sol)

$7\times8^2+7\times8^1+7\times8^0$

$=511$

d. 05726

$0\times8^4+5\times8^3+7\times8^2+2\times8^1+6\times8^0$

$=3030$

7. Convert decimal into octal

a. 4

Sol)

$8\,|\,4-4$
$0-0$

$(4)_{10}=(04)_8$

b. 10

Sol)

$8\,|\,10-2$
$1-1$

$(10)_{10}=(12)_8$

c. 625

$8\,|\,625-1$
$8\,|\,78\quad 6$
$8\,|\,9-1$
1

$625=(1161)_8$

d. 1024

$8\,|\,1024-0$
$8\,|\,128-0$
$8\,|\,16-0$
2

$(1024)_{10}=(2000)_8$

8. Convert the following octal number to binary

a. 107

Sol)

Converting octal into decimal

$1\times8^2+0\times8^1+7\times8^0$

Converting decimal to ~~octal~~ binary

71

2	71	1
2	35	1
2	17	1
2	8	0
2	4	0
2	2	0
	1	

$(71)_8 = (1000111)_2$

b. 2746

Sol)

Converting octal into decimal

$2\times8^3 + 7\times8^2 + 4\times8^1 + 6\times8^0$

$= 1510$

Converting decimal into binary

2	1510	0
2	755	1
2	377	1
2	188	0
2	94	0
2	47	1
2	23	1
2	11	1
2	5	1
2	2	0
	1	

$(2746)_8 = (10111100110)_2$

c. 66542

Sol^n

Converting octal into decimal

$$66542 = 6\times8^4+6\times8^3+5\times8^2+4\times8^1+2\times8^0$$

$$= 28002$$

Converting decimal into binary

2	28002	0
2	10041	1
2	5020	0
2	2510	0
2	1255	1
2	627	1
2	313	0
2	156	0
2	78	0
2	39	1
2	19	1
2	9	1
2	4	0
2	2	0
	1	

$$(66542)_8 = (100111000110010)_2$$

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d. 76543210

sol)

$76543210 = 7\times8^7 + 6\times8^6 + 5\times8^5 + 4\times8^4 + 3\times8^3 + 2\times8^2 + 1\times8^1 + 0\times8^0$

$= 16434824$

Converting decimal into binary

1	001
6	110
4	100
3	011
4	100
8	
2	
4	

$(16434824)_{10} =$

9. Convert binary to octal

a. 110

sol)

110 → 6

4 2 1

b. 011101

sol)

011 101 → 35

4 2 1 4 2 1

c. 010101011

sol)

010 101 011 → 253

4 2 1 4 2 1 4 2 1

d. 101110011

sol)

101 110 011 → 563

4 2 1 4 2 1 4 2 1

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10. Convert the hexadecimal number into octal:

a. 10

Sol:

Converting hexa into decimal

$10 = 1 \times 16^1 + 0 \times 16^0$

$= 16$

Converting decimal into binary

$$
\begin{array}{r|l}
2 & 16 \rightarrow 0 \\
2 & 8 - 0 \\
2 & 4 - 0 \\
2 & 2 - 0 \\
 & 1
\end{array}
$$

$16 = (10000)_2$

Converting binary into octal

$(10000)_2$ $\quad \underset{421}{010} \; \underset{421}{000} \rightarrow 2$

b. 8

Sol:

Converting hexa into binary

$$
\begin{array}{r|l}
2 & 8 - 0 \\
2 & 4 - 0 \\
2 & 2 - 0 \\
 & 1
\end{array}
$$

$(1000)_2$

Convert binary into octal

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001 000 → 1
421 421

d. 2A4f2D

Sol^n

A = 10
F = 15
D = 13

~~2 10 4 15 2 13~~
~~8421~~

2	10	4	15	2	13
8421	8421	8421	8421	8421	8421
0010	1010	0100	1111	0010	1101

$(001010100100111100101101)_2$

Converting binary into octal.

001	010	100	111	100	101	101
421	421	421	421	421	421	421
1	2	4	7	4	5	5

12442455

11. Convert decimal into hexadecimal

a. 32

Sol^n

16 | 32 − 0
2

$16 = (20)_{16}$

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b. 73

sol^n

16 | 73 → 9
4

16 = $(49)_{16}$

c. 65536

sol^n

16 | 65536 − 0
16 | 4096 − 0
16 | 256 − 0
16 | 16 − 0
1 — 1

$(65536)_{10} = (1$

d. 3020

sol^n:

16 | 3020 — 12 − C
16 | 118 − 12 − C
11

3020 − $(CC)_{16}$

e. 7848

sol^n

16 | 7848 − 8
16 | 490 → 10 − A
16 | 30 → 14 − E
1

7848 = ~~(8AE)~~
$(1EA8)_{16}$

12. Perform arithmenetic operation

a. A = (+42)
B = (−13)

b. A(+42)
B = (−13)

a. sol^n

A+B

A = (+42)

B = (−13)

Binary value of 42 = 101010

Making it 8 bit = 00101010

Binary value of −13 = 1101

1's complement = 0010

2's complement = 0010
+1
0011

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Making it 8bit = 11110011

A (+42) = 0 0 1 0 1 0 1 0
B (-13) = 1 1 1 1 0 0 1 1
29 = 1 0 0 0 1 1 1 0 1

now,

neglect the extra bit then A+B = 00011101

b. ~~A (+42)~~
~~B (-13)~~