



S.P.M College, Udaipur

Bachelor Of Computer Application (BCA)

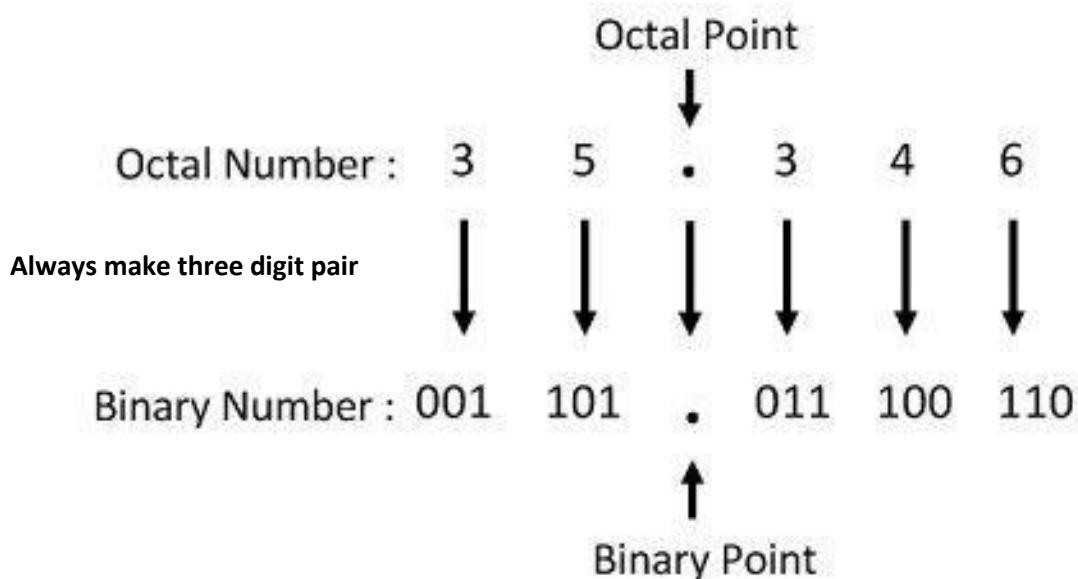
Part -1 (Paper-1)

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Computer Fundamental

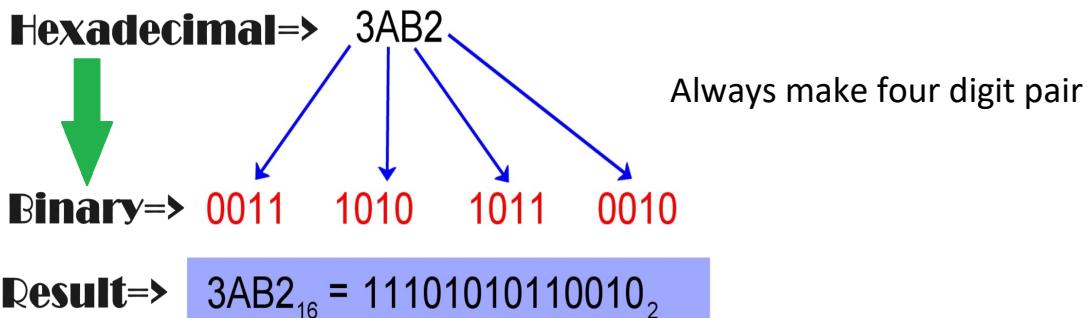
DATA REPRESENTATION

Q. Convert Octal to Binary $(\quad)_8 = (\quad)_2$



Octal	Binary
i. 27	10111
ii. 77	111111
iii. 58	Invalid
iv. 777	111111111
v. 101	1000001
vi. 500	101000000
vii. 32.7	11010.111
viii. 85.5	Invalid
ix. 33.3	11011.011
x. 55.50	101101.101000

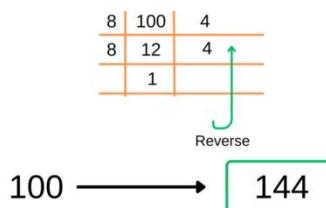
Q. Convert Hexadeciaml to Binary()₁₆ = ()₂



Si no	Hexa	Binary
1	45	1000101
2	FA	11111010
3	5D	1011101
4	99	10011001
5	03	11
6	1C.2	11100.0010
7	33.98	110011.10011000
8	AAA.8	101010101010.1000
9	55	1010101
10	24E7	10010011100111

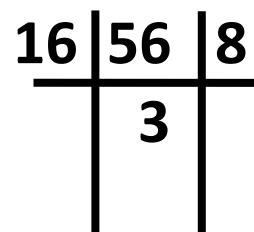
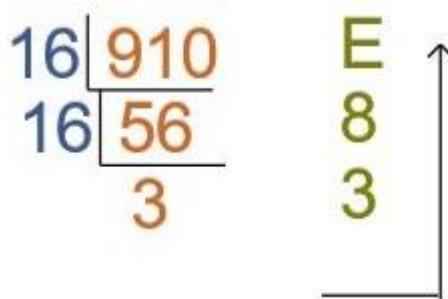
Q. Convert Decimal to Octal ()₁₀ = ()₈

Decimal= 100 \longrightarrow Octal ?



Si no	Decimal	Octal
1	56	70
2	89	131
3	2025	3751
4	180	264
5	8	10

Q. Convert Decimal to Hexadecimal $(\quad)_{10} = (\quad)_{16}$



Si no	Decimal	Hexa
1	56	38
2	160	A0
3	35	23
4	325	145
5	80	50

Hexadecimal to Decimal

Convert $2c9b$ to decimal

$$(2 \times 16^3) + (12 \times 16^2) + (9 \times 16^1) + (11 \times 16^0)$$

$$8192 + 3072 + 144 + 11$$

$$\underline{11419}$$

$$\therefore (2c9b)_{16} = (11419)_{10}$$

Octal to Decimal

$$(1725.43)_8 = (\ ?)_{10}$$

$$1 \cdot 8^3 + 7 \cdot 8^2 + 2 \cdot 8^1 + 5 \cdot 8^0 + 4 \cdot 8^{-1} + 3 \cdot 8^{-2}$$

$$512 + 448 + 16 + 5 + 0.5 + 0.046875$$

$$= 981.546875$$

$$\therefore (1725.43)_8 = (981.546875)_{10}$$

Find Octal to Hexadecimal

Step 1

Octal to Binary

Step 2

Binary to hexa

Hexadecimal to Octal

Hexadeciaml to Binary

Binary to octal

❖ Binary Arithmetic

- All the arithmetic operations are possible in binary numbering system like addition, subtraction, multiplication and division.

➤ Binary addition

The following rules of binary addition are to be considered.

Binary Addition Table

Addition	=	Result	Carry
0 + 0	=	0	0
0 + 1	=	1	0
1 + 0	=	1	0
1 + 1	=	0	1

$$\begin{array}{r}
 & \begin{matrix} 11 & 1 \end{matrix} \leftarrow \text{Carry bits} \rightarrow \begin{matrix} 11 \end{matrix} \\
 \begin{matrix} 1001101 \\ + 0010010 \end{matrix} & \begin{array}{r} 1001001 \\ + 0011001 \\ \hline 1100010 \end{array} & \begin{array}{r} 1000111 \\ + 0010110 \\ \hline 1011101 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \begin{array}{r}
 \begin{array}{r}
 1 & 1 & 1 & 1 & \leftarrow \text{carry} \\
 1 & 1 & 1 & 0 & 1 \\
 (+) \ 1 & 1 & 0 & 1 & 1 \\
 \hline 1 & 1 & 1 & 0 & 0 & 0
 \end{array}
 \end{array}
 \begin{array}{r}
 \begin{array}{r}
 \begin{array}{r}
 0 & 1 & 1 & 1 \\
 00111 & & & 7 \\
 \hline 10101 & & & 21 \\
 \hline 11100 & = & 28
 \end{array}
 \end{array}
 \begin{array}{r}
 \begin{array}{r}
 \begin{array}{r}
 11 & 1 \\
 1011.01 \\
 + 11.011 \\
 \hline 1110.101
 \end{array}
 \end{array}
 \end{array}$$

- $101 + 101 =$
- $111011 + 001101 =$ (ppu 2024)
- $010111 + 101101 =$ (ppu 2024)

➤ Binary Subtraction

The following rules of binary subtract are to be considered.

A - B	Subtract	Borrow
0 - 0	0	0
0 - 1	1	1
1 - 0	1	0
1 - 1	0	0
10 - 1	1	0

$$\begin{array}{r}
 & 0 & 10 \\
 1 & 1 & 0 & 0 \\
 (-) & 1 & 0 & 1 & 0 \\
 \hline
 & 0 & 0 & 1 & 0
 \end{array}
 \quad \text{borrow}$$

$$\begin{array}{r}
 1100 \\
 -0010 \\
 \hline
 1010
 \end{array}$$

$$\begin{array}{r}
 1000 \\
 -0111 \\
 \hline
 0001
 \end{array}$$

$$\begin{array}{r}
 1100 \\
 -0111 \\
 \hline
 0101
 \end{array}$$

Circuit Globe

$$\begin{array}{r}
 1010 \\
 -101 \\
 \hline
 101
 \end{array}$$

$$\begin{array}{r}
 1100 \\
 -1011 \\
 \hline
 1
 \end{array}$$

$$\begin{array}{r}
 110000 \\
 -11110 \\
 \hline
 10010
 \end{array}$$

$$\begin{array}{r}
 0011010 \\
 101011.101 \\
 -1011.11 \\
 \hline
 1001.111
 \end{array}$$

- i. $1010101 - 1001100 =$
- ii. $111000 - 011010 =$ ppu 2020
- iii. $0110 - 0010 =$ ppu 2020
- iv. $1111 - 1001 =$ ppu 2020
- v. $1100 - 1010 =$ ppu 2020

➤ Binary Multiplication

The following rules of binary multiplication are to be considered.

Input A	Input B	Multiply (M) $A \times B$
0	0	0
0	1	0
1	0	0
1	1	1

$$\begin{array}{r}
 110 \\
 \times 11 \\
 \hline
 ①110 \\
 110 \times \\
 \hline
 10010
 \end{array}$$

$$\begin{array}{r}
 110 \\
 \times 101 \\
 \hline
 110 \\
 + 000X \\
 + 110XX \\
 \hline
 11110
 \end{array}$$

$$\begin{array}{r}
 11011 \\
 \times 101 \\
 \hline
 ①11011 \\
 ①00000X \\
 11011XX \\
 \hline
 10000111
 \end{array}$$

$$\begin{array}{r}
 & 1 & 1 & 0 & 0 & \xrightarrow{\hspace{1cm}} \text{Multiplicand} \\
 \times & 1 & 1 & 0 & 1 & \xrightarrow{\hspace{1cm}} \text{Multiplier} \\
 \hline
 & 1 & 1 & 0 & 0 \\
 + & 0 & 0 & 0 & 0 & X \\
 + & 1 & 1 & 0 & 0 & X \ X \\
 + & 1 & 1 & 0 & 0 & X \ X \ X \\
 \hline
 \end{array}$$

Ans. 1 0 0 1 1 1 0 0

x	1001.11	2 places
1 1 1 1 1 1		
1010.1001	x x x x x	
0000.0000	x x x x	
0000.0000	x x x	
1010.1001	x x	
1010.1001	x	
1010.1001		
1100110.111111		6 places

➤ Binary Division

The following rules of binary multiplication are to be considered.

Input A	Input B	Divide (D) A/B
0	0	Not defined
0	1	0
1	0	Not defined
1	1	1

Binary Division

$$\begin{array}{r}
 & 1 1 1 1 1 0 \\
 10) & \overline{1 1 1 1 1 0} \\
 -10 & \downarrow \\
 & 1 1 \\
 -10 & \downarrow \\
 & 1 1 \\
 -10 & \downarrow \\
 & 1 1 \\
 -10 & \downarrow \\
 & 1 0 \\
 -10 & \downarrow \\
 & 0 0 \\
 -10 & \downarrow \\
 & 0 0
 \end{array}$$

Dividend: 111110
 Divisor: 10
 Quotient: 111110
 Remainder: 0

- 1) $11000 / 100 = 110$
 - 2) $10110 / 10 = 1011$
 - 3) $101010 / 11 = 1110$
 - 4) $111100 / 10 = 11110$
 - 5) $100000 / 1000 = 100$