



# S.P.M College, Udantpuri

Bachelor Of Computer Application (BCA)

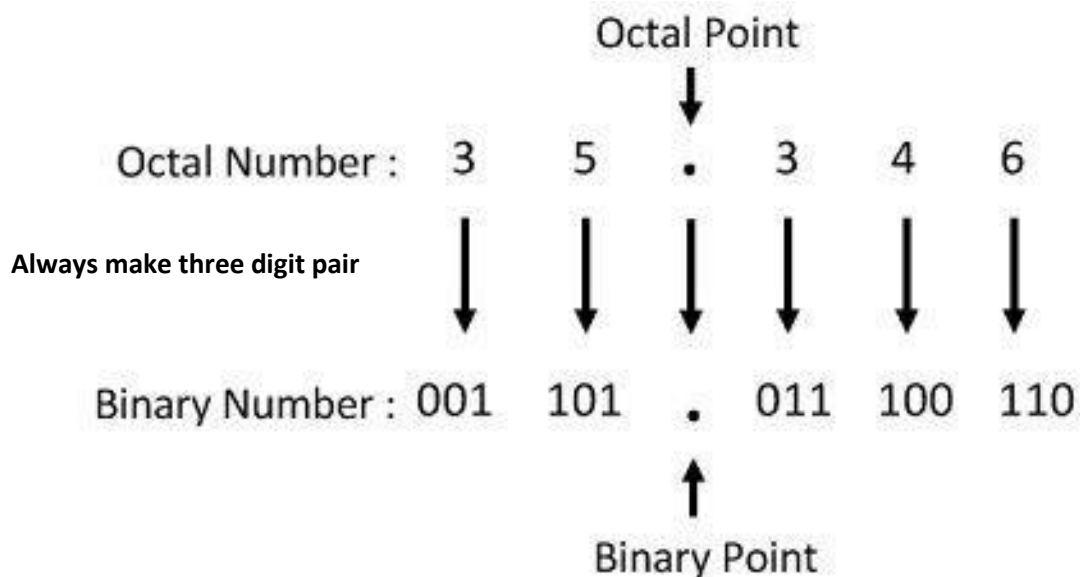
Part -1 (Paper-1)

– Hira Kumar

## Computer Fundamental

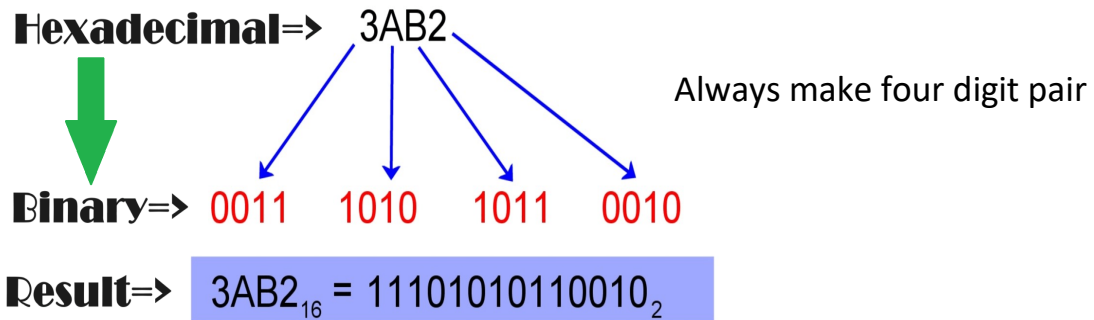
## DATA REPRESENTATION

**Q. Convert Octal to Binary (     )<sub>8</sub> = (     )<sub>2</sub>**



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 Hexadecimal to Binary ( )<sub>16</sub> = ( )<sub>2</sub>



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 ( )<sub>10</sub> = ( )<sub>8</sub>

Decimal = 100 → Octal ?

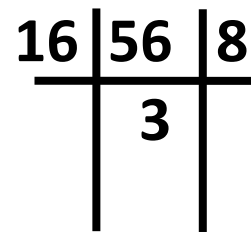
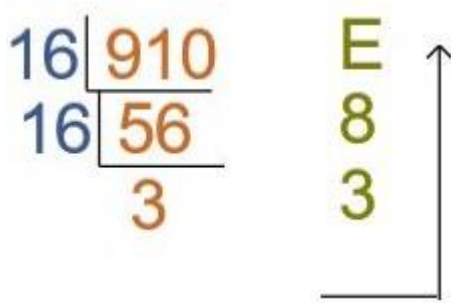
8	100	4
8	12	4
	1	

Reverse

100 → 144

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

**Q. Convert Decimal to Hexadecimal (     )<sub>10</sub> = (     )<sub>16</sub>**



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

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

$$8192 + 3072 + 144 + 11$$

$$11419$$

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

## Octal to Decimal

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

$$\begin{array}{ccccccc} & & 1 & 7 & 2 & 5 & . & 4 & 3 \\ \swarrow & \searrow & \downarrow & \downarrow & \downarrow & \downarrow & & \downarrow & \downarrow \\ 1 \times 8^3 + & 7 \times 8^2 + & 2 \times 8^1 + & 5 \times 8^0 + & 4 \times 8^{-1} + & 3 \times 8^{-2} \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 512 + & 448 + & 16 + & 5 + & 0.5 + & 0.046875 \\ = & 981.546875 \\ \therefore (1725.43)_8 = (981.546875)_{10} \end{array}$$

## 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

$$\begin{array}{r} 1001101 \\ + 0010010 \\ \hline 1011111 \end{array} \quad \begin{array}{r} 11 \quad 1 \leftarrow \text{Carry bits} \rightarrow 11 \\ 1001001 \\ + 0011001 \\ \hline 1100010 \end{array} \quad \begin{array}{r} 1000111 \\ + 0010110 \\ \hline 1011101 \end{array}$$

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

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

### ➤ Binary Substraction

The following rules of binary substract 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

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

Circuit Globe

$$\begin{array}{r}
 1 \phantom{0}1 \phantom{0}0 \phantom{0} \\
 - 0 \phantom{0}0 \phantom{0}1 \phantom{0} \\
 \hline
 1 \phantom{0}0 \phantom{0}1 \phantom{0}
 \end{array}$$

$$\begin{array}{r}
 1 \phantom{0}0 \phantom{0}0 \phantom{0} \\
 - 0 \phantom{0}1 \phantom{0}1 \phantom{0} \\
 \hline
 0 \phantom{0}0 \phantom{0}0 \phantom{0}1
 \end{array}$$

$$\begin{array}{r}
 1 \phantom{0}1 \phantom{0}0 \phantom{0} \\
 - 0 \phantom{0}1 \phantom{0}1 \phantom{0} \\
 \hline
 0 \phantom{0}1 \phantom{0}0 \phantom{0}1
 \end{array}$$

$$\begin{array}{r}
 1 \phantom{0}0 \phantom{0}1 \phantom{0} \\
 - 1 \phantom{0}0 \phantom{0}1 \\
 \hline
 1 \phantom{0}0 \phantom{0}1
 \end{array}$$

$$\begin{array}{r}
 1 \phantom{0}1 \phantom{0}0 \phantom{0} \\
 - 1 \phantom{0}0 \phantom{0}1 \phantom{0} \\
 \hline
 1
 \end{array}$$

$$\begin{array}{r}
 1 \phantom{0}1 \phantom{0}0 \phantom{0}0 \phantom{0} \\
 - 1 \phantom{0}1 \phantom{0}1 \phantom{0}1 \phantom{0} \\
 \hline
 1 \phantom{0}0 \phantom{0}1 \phantom{0}0
 \end{array}$$

$$\begin{array}{r}
 10101.101 \\
 - 1011.11 \\
 \hline
 1001.111
 \end{array}$$

- 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) AxB
0	0	0
0	1	0
1	0	0
1	1	1

$$\begin{array}{r}
 \phantom{0}1 \phantom{0}1 \phantom{0}0 \\
 \times \phantom{0}1 \phantom{0}1 \\
 \hline
 ① \phantom{0}1 \phantom{0}1 \phantom{0}0 \\
 1 \phantom{0}1 \phantom{0}0 \times \\
 \hline
 1 \phantom{0}0 \phantom{0}0 \phantom{0}1 \phantom{0}0
 \end{array}$$

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

$$\begin{array}{r}
 \phantom{0}1 \phantom{0}1 \phantom{0}0 \phantom{0}1 \phantom{0}1 \\
 \times \phantom{0}1 \phantom{0}0 \phantom{0}1 \\
 \hline
 ① \phantom{0}1 \phantom{0}1 \phantom{0}0 \phantom{0}1 \phantom{0}1 \\
 ① \phantom{0}0 \phantom{0}0 \phantom{0}0 \phantom{0}0 \phantom{0}0 \times \\
 1 \phantom{0}1 \phantom{0}0 \phantom{0}1 \phantom{0}1 \times \times \\
 \hline
 1 \phantom{0}0 \phantom{0}0 \phantom{0}0 \phantom{0}0 \phantom{0}1 \phantom{0}1 \phantom{0}1
 \end{array}$$

$$\begin{array}{r}
 1100 \text{ } \rightarrow \text{Multiplicand} \\
 \times 1101 \text{ } \rightarrow \text{Multiplier} \\
 \hline
 1100 \\
 + 0000 \text{ X} \\
 + 1100 \text{ XX} \\
 + 1100 \text{ XXX} \\
 \hline
 \text{Ans. } 10011100
 \end{array}$$

$$\begin{array}{r}
 1010.1001 \text{ 4 places} \\
 \times 1001.11 \text{ 2 places} \\
 \hline
 1111111 \\
 1010.1001 \text{ xxxxx} \\
 0000.0000 \text{ xxxxx} \\
 0000.0000 \text{ xxx} \\
 1010.1001 \text{ xx} \\
 1010.1001 \text{ x} \\
 1010.1001 \\
 \hline
 1100110.111111 \text{ 6 places}
 \end{array}$$

## ➤ 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

$$\begin{array}{r}
 11 \\
 11 \overline{) 10010} \\
 \underline{11} \phantom{0} \\
 11
 \end{array}$$

**Binary Division**

$$\begin{array}{r}
 111110 \\
 10 \overline{) 1111100} \\
 \underline{-10} \phantom{00} \\
 11 \phantom{00} \\
 \underline{-10} \phantom{00} \\
 11 \phantom{00} \\
 \underline{-10} \phantom{00} \\
 11 \phantom{00} \\
 \underline{-10} \phantom{00} \\
 10 \phantom{00} \\
 \underline{-10} \phantom{00} \\
 00 \phantom{00} \\
 \underline{00} \\
 00
 \end{array}$$

Dividend: 1111100  
Divisor: 10  
Quotient: 111110  
Remainder: 0

$$\begin{array}{r}
 1111 \text{ Quotient} \\
 100 \overline{) 11111000} \\
 \underline{100} \phantom{000} \\
 111 \phantom{000} \\
 \underline{100} \phantom{000} \\
 110 \phantom{000} \\
 \underline{100} \phantom{000} \\
 100 \phantom{000} \\
 \underline{100} \phantom{000} \\
 000 \phantom{000} \\
 \underline{000} \phantom{000} \\
 000 \text{ Remainder}
 \end{array}$$

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

===== HIRA KUMAR =====