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MSB LSB

$(0\,11\,010\,101)_2 = (325)_8$

3 2 5

$(101)_2 = 2^2\times1 + 2^0\times1 = 5$

$(010)_2 = 2^1\times1 = 2$

$(011)_2 = 2^1\times1 + 2^0\times1 = 3$

BINARY TO OCTAL CONVERSION

FRACTIONAL PART CONVERSION:

GROUPING OF THREE BITS IS MADE STARTING FROM BINARY POINT AND MOVING TOWARDS RIGHT

Binary $\quad$ Octal

$2 \quad 8$

$2^{3} = 8$

$$(0.\overbrace{101}^{5}\overbrace{011}^{3}\overbrace{011}^{3})_2 = (0.533)_8$$

Binary point

BINARY TO HEXADECIMAL CONVERSION

INTERGER PART CONVERSION:

DIVIDE BINARY NUMBER INTO GROUP OF FOUR STARTING FROM LSB AND MOVING TOWARDS MSB

MSB ← LSB

$000(1\,0\,1\,0\;1\,1\,0\,1\,0\;1\,1\,0\,1)_2 = (15AD)_{16}$

1 5 A D

Binary 2 Hexa 16

2 2^4

$2^3\ 2^2\ 2^1\ 2^0$

1101

$2^3 \times 1 + 2^2 \times 1 + 2^0 \times 1$

$8 + 4 + 1 = 13 = D$

$2^3\ 2^2\ 2^1\ 2^0$

1010

$2^3 \times 1 + 2^1 \times 1$

$8 + 2 = 10 = A$

BINARY TO HEXADECIMAL CONVERSION

$2^3 \; 2^2 \; 2^1 \; 2^0$

$1 \; 0 \; 0 \; 0$

$2^3 \times 1 = 8$

FRACTIONAL PART CONVERSION:

GROUPING OF FOUR BITS IS MADE STARTING FROM BINARY POINT AND MOVING TOWARDS RIGHT

$(0.\underbrace{1010}_{A}\underbrace{1101}_{D}\underbrace{1000}_{8})_2 = (0.AD8)_{16}$

Binary

(1)OCTAL TO BINARY CONVERSION

$2 = 2^{3}$

REPLACE EACH OCTAL DIGIT BY 3 BIT EQUIVALENT BINARY

$(7\ 3\ 5)_8 = (111\ 011\ 101)_2$

111 011 101

$(5\ 4\ 7\ 6)_8 = (\quad)_2$

101 100 111 110

$(101\ 100\ 111\ 110)_2$

(2)OCTAL TO BINARY CONVERSION

REPLACE EACH OCTAL DIGIT BY 3 BIT EQUIVALENT BINARY

$(753.24)_8 = (\quad)_2$

$$\begin{array}{ccccc} 7 & 5 & 3 & . & 2 & 4 \\ \downarrow & \downarrow & \downarrow & & \downarrow & \downarrow \\ 111 & 101 & 011 & & 010 & 100 \end{array}$$

$(111\ 101\ 011 . 010\ 100)_2$

(1)HEXADECIMAL TO BINARY CONVERSION

$2 = 2^4 = 16$

REPLACE EACH HEXADECIMAL DIGIT BY 4 BIT EQUIVALENT BINARY

$$(AC9.87)_{16} = (1010\ 1100\ 1001.1000\ 0111)_2$$

1010 1100 1001 1000 0111

(1)Determine the value base

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$(16)_{10} = (100)_b$

$(16)_{10} = b^2$

$b^2 = 16$

$b = \sqrt{16} = 4$

$b^2\ b^1\ b^0$

$(100)_b = (\quad)_{10}$

$b^2 \times 1 + 0 \times b^1 + 0 \times b^0$

Base = 4 Number

octal to Hexadecimal

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$(734)_8 = (1DC)_{16}$ ✓

① octal to binary

② Binary to Hexa

7 3 4

MSB ↓ ↓ ↓ LSB

Binary 000 111 011 100

↓

Hexa 1 D C

Hexa decimal to octal Conversion

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Hexa decimal

$(9AB8.73)_{16} = (115270.346)_8$

MSB ... LSB

Binary: 1001 1010 1011 1000 . 0111 0011

Octal: 1 1 5 2 7 0 . 3 4 6

Determine base for $(211)_b = (152)_8$

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$\overset{8^2\,8^1\,8^0}{(152)_8} = (\quad)_{10} \Rightarrow 1\times 8^2 + 5\times 8^1 + 2\times 8^0 = \underline{\underline{106}}$

$\overset{b^2\,b^1\,b^0}{(211)_b} = 2b^2 + 1b + 1$

$(211)_b = (152)_8$ $\quad ax^2 + bx + c = 0 \Rightarrow \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$2b^2 + b + 1 = 106 \Longrightarrow 2b^2 + b - 105 = 0$

$b = \underline{\underline{7}}$ or -7.5

Base must be positive, so $b = \underline{\underline{7}}$

(3)Determine the value base

$23 + 44 + 14 + 32 = \overset{b^2 b^1 b^0}{223} \longrightarrow$ base ?

$\overset{b^1 b^0}{(23)_b} = 2b+3$

$(44)_b = 4b+4$

$(14)_b = 1b+4$

$(32)_b = 3b+2$

LHS

$2b+3+4b+4+1b+4$
$+3b+2$

RHS

$2b^2+2b+3$

$2b+3+4b+4+1b+4+3b+2 = 2b^2+2b+3$

$b = \underline{\underline{5}}$

Base $= 5$

(4)Determine the value base

$\frac{302}{20} = 12.1$

$\frac{3b^2+2}{2b} = b+2+\frac{1}{b}$

$\frac{3b^2+2}{2\cancel{b}} = \frac{b^2+2b+1}{\cancel{b}}$

$3b^2+2 = 2b^2+4b+2$

$b^2-4b=0$

$b^2-4b=0$

$b(b-4)=0$

$b=0,\ b=4$

base must be +ve

So Base = 4