COMPUTER SCIENCE & IT

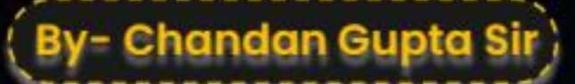






Lecture No: 02

Miscellaneous Topics



Recap of Previous Lecture







Number System





Number system Cont.

(Concept of Compliments) -> defined for weighted no system with box-12

- (91-1)'s compliment & 91's compliment

Decimal no. 8ystem

bax = 10

10's compliment

1's compliment

Binary no. 8ystem

bax = 2

2's compliment

9's and 10's compliments & 1's and 2's compliments



Lets understand with examples → 9's and 10's compliments

•
$$(234.57)_{10} \xrightarrow{9/5} (76542)_{10} \longrightarrow (765.42)_{10} \rightarrow (765.42)_{10} \rightarrow \text{find 9/5 compliment}$$



$$76542 + 1 = 76543$$

Lets understand with examples $\rightarrow 1$'s and 2's compliments



•
$$(|0|1)_2 \xrightarrow{1/5} (|1|1)_2 - (|0|1)_2 = (0|00)_2$$

• $(0|00)_2 + 1 = (0|01)_2$

$$\cdot (||0|| \cdot 0|)_{2} \xrightarrow{|''|} (00|0 \cdot |0)_{2}$$

$$\frac{2''}{2''}$$

$$(00|0 \cdot |1)_{2}$$

$$\begin{array}{c}
\cdot \left(| | 0 | \cdot 0 | \right)_{2} \xrightarrow{1'^{5}} \left(0 0 | 0 \cdot | 0 \right)_{2} \\
\xrightarrow{2'^{5}} \left(0 0 | 0 \cdot | 1 \right)_{2}
\end{array}$$

$$\begin{array}{c}
\cdot \left(| 0 | | | 0 | 0 | 0 \rangle_{2} \xrightarrow{1'^{5}} \left(0 | 0 0 0 | 0 | 0 \rangle_{2} \\
& \downarrow 2'^{5} \\
& \downarrow 2'^{5}
\end{array}$$

$$\begin{array}{c}
\cdot \left(| 0 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 \rangle_{2}
\end{array}$$

$$\begin{array}{c}
\cdot \left(| 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 \rangle_{2}
\end{array}$$

$$\begin{array}{c}
\cdot \left(| 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 \rangle_{2}
\end{array}$$

$$\begin{array}{c}
\cdot \left(| 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 \rangle_{2}
\end{array}$$

$$\begin{array}{c}
\cdot \left(| 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 \rangle_{2}
\end{array}$$

9999)10 (0000) 1015 9999 (0000)10 0000 discard (0000)2 (0000)2 (0006)2 () 0000 -0000 (D0000 - 8% (0000)2



(00000) 3/5 (00000)

$$(00000)_{2} \xrightarrow{2'/5} (00000)_{2}$$

$$(10000)_{2} \xrightarrow{2'/5} (10000)_{2}$$

$$1''' \Rightarrow (0|1|1)_{2}$$

$$2'/5 \Rightarrow 0|1|1|$$

$$+ 1$$

$$(10000)_{2}$$

1 nous
$$2^{n}$$
 1 nous 1 (same nou)

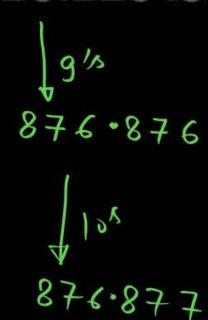
$$\frac{(124)_6}{\frac{5'^5}{6'^5}} \xrightarrow{(555)_6} - (124)_6 = (431)_6$$

$$\xrightarrow{6'^5} (432)_6$$

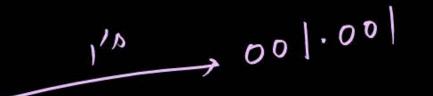
$$\begin{array}{ccc}
 & \left(2473.20\right)_{8} & \xrightarrow{7'^{5}} & \left(5304.57\right)_{8} \\
& & \left(5304.60\right)_{8}
\end{array}$$

9's and 10's compliment | w 123.123 is

- (a) 876.876, 877.876
- (b) 876.876, 876.877
- (c) 987.987, 988.987
- (d) 987.987, 987.988



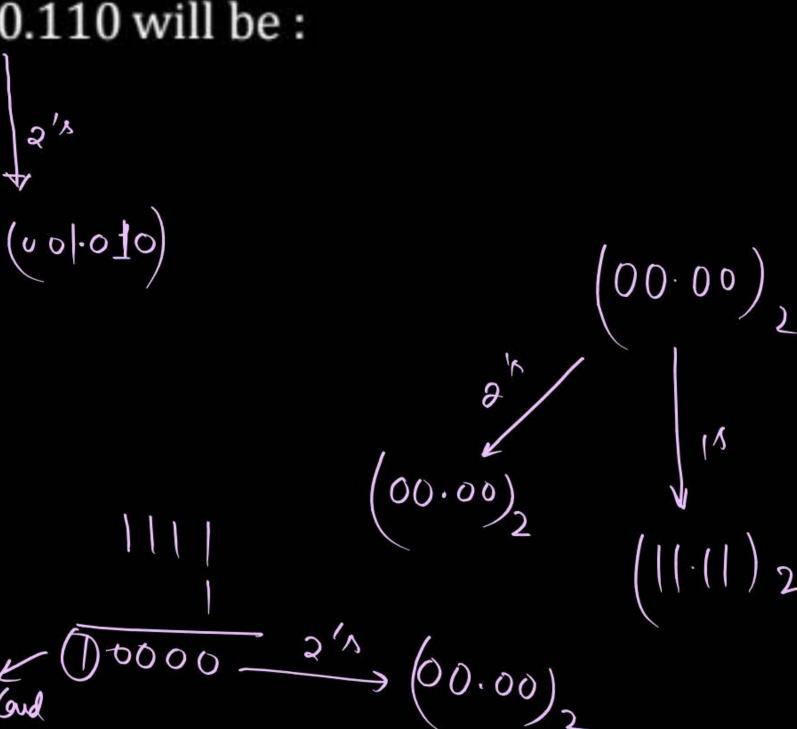


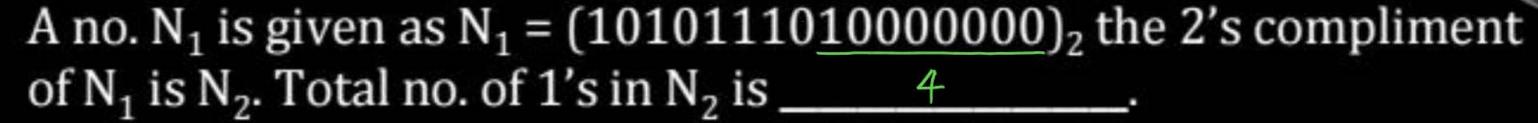




1's and 2's compliment of 110.110 will be:

- (a) 001.001, 010.001
- (b) 001.001, 011.001
- (c) 001.001, 001.010
- (d) 011.011, 011.010









2's compliment of no. N_1 is given as $(110.011)_2$ then no. N_1 is

(b)
$$(001.100)_2$$

(c)
$$(010.100)_2$$

$$N_{1} = (001 \cdot 101) 2$$

$$N = |10|0 \xrightarrow{2^{1/3}} (001|0) \xrightarrow{2^{1/3}} (110|0)_{2}$$

$$(10|0)_{2}$$

$$N = ||0|0 \xrightarrow{1/5} (00|0|)_2$$

$$N_2$$

Signed No. Representation



Sign magnitude Method

1's compliment method

21s compliment

· tVe no. in all the methods is refresented in same manner, only -ve no supresentation is different in different methods.

Sign Magnitude Method

two different quebelsentations of same zero



n=4-bit

$$0 \circ | 0 \longrightarrow +2 \qquad 10 | 0 \longrightarrow (-2)$$

$$0 0 1 \longrightarrow +3$$

$$0 \mid 0 \mid \longrightarrow +5$$

$$0111 \longrightarrow +7$$

$$\begin{array}{c} \uparrow + 4 \\ \rightarrow +5 \\ \rightarrow +6 \\ \rightarrow +7 \\ \end{array}$$

$$\begin{array}{c} 1 \mid 00 \longrightarrow -4 \\ \downarrow 1 \mid 0 \mid \longrightarrow -5 \\ \downarrow 1 \mid 1 \mid 0 \longrightarrow -6 \\ \downarrow 1 \mid 1 \mid 1 \longrightarrow -7 \\ \end{array}$$

$$-7 + 6 + 7$$
, $-(2^{4-1}) + (2^{4-1})$

10 11 --- -3

that 41 one supresentation wasted.

. Total no of numbers that can be supresented using n-bits in sign magnitude method =(2-1)



· Range of the no.s =
$$-(2^{n-1})$$
 to $+(2^{n-1})$

$$(|0||0|)_{2}$$
 sign $-(13)_{0}$ $(|0||0|)_{2}$ $\frac{5im}{magnitude}$ $-(45)_{0}$

1's Compliment Method

be +ve or-ve

two different suprescutations of same give



one supresentation got wasted.

$$(-3)$$
 $\frac{145}{(-3)}$
 (0011)
 $(+3)$

· Total no of numbers (distinct numbers) that can be refreshed using n-bits in 1's compliment substantial
$$=(2^{n}-1)$$

• Range =
$$-\begin{bmatrix} 2^{(n-1)} \\ 2^{-1} \end{bmatrix}$$
 to $+\begin{bmatrix} 2^{(n-1)} \\ 2^{-1} \end{bmatrix}$

$$(-18)_{10}(101101)_{2} \longrightarrow -(18)_{10}$$

$$+(18)_{10}(010010)_{2} -(-18) = +18$$

$$(01011)_2 \longrightarrow +(11)_b$$



Topic: 2 Min Summary

→ Numba system





Thank you

Soldiers!

