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Quiz-2 Number system
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Ques1 what is the result of the expression below
expressed in hexadecimal?

$$(678 \cdot 6)_{16} + 54 \cdot C_{16} + (EDA \cdot D)_{16}$$

Ans:-

carry   1   1   1

    6 . 7 8 . 6

      5 4 . C

    E . D A . D

   1 5 . A 7 . F

Simplify!-

1. $6 + C(12) + D(13) = 31 = 1F$ in hexadecimal

2. $1(carry) + 8 + 4 + A(10) = 23 = 17$ in hexadecimal

3. $1(carry) + 7 + 5 + D(13) = 26 = 1A$ in hexadecimal

4. $1(carry) + 6 + 0 + E(14) = 21$
$$= 15 \text{ in hexadecimal}$$

Ans:- $678 \cdot 6_{16} + 54 \cdot C_{16} + EDA \cdot D_{16} = (15A7 \cdot F)_{16}$

Ques-2 what is the value below expressed in decimal?

$$(3AD \cdot E)_{16}$$

Ans:- $(3AD \cdot E)_{16} = (?)_{10}$

$3AD \cdot E = (3 \times 16^2) + (A \times 16^1) + (D \times 16^0) + (E \times 16^{-1})$

$= (3 \times 256) + (10 \times 16) + (13 \times 1) + (14 \times 1/16)$

$= 768 + 160 + 13 + 0.875$

$= (941.875)_{10}$

Ans:- $(3AD \cdot E)_{16} = (941.875)_{10}$

**Ques-3** what is the result of the expression below expressed in binary?

$$10101.01010_2 - 1111.11_2$$

Ans:-

Borrow     1   10 1 10

Borrow    0 +0 0 +0 0   10

$$+\ \cancel{0}+\cancel{0}+.\cancel{0}1010$$
$$\ \ \ 0\ 1\ 1\ 1\ 1\ 1\ .\ 1\ 1\ 0\ 0\ 0$$
$$\overline{\ \ \ 0\ 0\ 1\ 0\ 1\ .\ 1\ 0\ 0\ 1\ 0}\ .$$

Step 1:- $0 - 0 = 0$ ;   Step 2:- $1 - 0 = 1$ ;   Step 3:- $0 - 0 = 0$

Step-4:- $1 - 1 = 0$

Step 5:- $0 - 1$ not possible take a borrow from nearest 1.
$$10 - 1 = 1$$

Step-6   $0 - 1$ not possible take borrow from nearest 1
$$10 - 1 = 1$$

Step 7:-   $1 - 1 = 0$

~~Overflow~~ ~~as~~ Step 8→   Again $0 - 1$ not possible take the borrow from the nearest 1 ; $10 - 1 = 1$

Step 9:- $1 - 1 = 0$ ;   Step 10= $0 - 0 = 0$

$$\boxed{\text{Ans :- } (10101.01010)_2 - (1111.11)_2 = (101.10010)_2}$$

**Ques-4**   $1011.101_2 + 101.11_2 + 1100.011_2$

Carry

Carry    1   1 1   1 1   1 1

$$\ \ 1\ .\ 0\ 1\ 1\ .\ 1\ 0\ 1$$
$$\ \ 1\ 0\ 1\ .\ 1\ 1\ 0$$
$$\underline{\ \ 1\ 1\ 0\ 0\ .\ 0\ 1\ 1}$$
$$\ 1\ 1\ 1\ 0\ 1\ .\ 1\ 1\ 0$$

Step-1 = 1+0+1=10, placed 0 at same column and carry 1 on next column.
Step 2 = 1(Carry)+0+1+1=11, placed 1 at same col. and carry 1 on the next col.
Step3= 1(Carry)+1+1+0= 11, placed 1 at same col. and carry 1 on the next col.
Step-4= 1(Carry)+1+1+0= 11, placed 1 at same col. and carry 1 on the next col.
Step5= 1(Carry)+1+0+0= 10, placed 0 at same col. and carry 1 to the next
Step6= 1(Carry)+0+1+1= 11; placed 1 at same col. and carry 1 to the next
step-7 1(Carry)+1+0+1=11.

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$$\text{Ans:- } 1011.101_2 + 101.11_2 + 1100.011_2 = (11101.110)_2$$

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Ques what is the value below expressed in hexadecimal?

$$(110110.11)_2$$

Ans:- Solve this by BCD method.
(Binary - coded - decimal)

- Group the binary number into set of 4 bits from right index of the Radix point. If necessary add zeros.
- Convert each four bits into hexadecimal equivalent.

$$\underset{1st}{\underline{0011}}, \underset{2nd}{\underline{0110}} \cdot \underset{3rd}{\underline{1100}} = (36.C)_{16}$$

| Binary | 4-bit 8 · 4 2 1 | hexadecimal |
|--------|-----------------|-------------|
| 0011 | 0 0 1 1 | 3 |
| 0110 | 0 1 1 0 | 6 |
| 1100 | 1 1 0 0 | 12 = C in hexadecimal |

$$\text{Ans: } (110110.11)_2 = (36.C)_{16}$$