Ans to the qr no 1 (a)

1(a) $(101110010001)_2$

Binary to decimal :

$(101110010001)_2 = 1\times2^{11}+0\times2^{10}+1\times2^{9}+1\times2^{8}+1\times2^{7}+0\times2^{6}+0\times2^{5}+1\times2^{4}+0\times2^{3}+0\times2^{2}+0\times2^{1}+1\times2^{0}$

$= 2048+1024\times0+512+256+128+64\times0+32\times0+16+8\times0+4\times0+2\times0+1$

$= 2048+0+512+256+128+0+0+16+0+0+0+1$

$= (2961)_{10}$

$\therefore (101110010001)_2 = (2961)_{10}$

Ans to the qr no 1 (b)

$$(11011\cdot101)_2 = 1\times2^4+1\times2^3+0\times2^2+1\times2^1+1\times2^0+1\times2^{-1}$$
$$+0\times2^{-2}+1\times2^{-3}$$

$$= 16+8+0\times4+2+1+2^{-1}+0+2^{-3}$$

$$= (27\cdot625)_{10}$$

$$\therefore (11011\cdot101)_2 = (27\cdot625)_{10}$$

Ans to the qr no 2

Decimal to binary :

2	4195	1	(LSB)
2	2097	1	
2	1048	1	
2	524	0	
2	262	0	
2	131	0	
2	65	1	
2	32	1	
2	16	0	
2	8	0	
2	4	0	
2	2	0	
2	1	0	
	0	1	(MSB)

$$\therefore (4195)_{10} = (10000011000\,111)_2$$

Ans to the qr no 3 (a)

Octal to decimal :

$(45)_8 = 4 \times 8^1 + 5 \times 8^0$

$= 32 + 5$

$= (37)_{10}$

$\therefore (45)_8 = (37)_{10}$

Ans to the qr no 3 (b)

$(2173)_8 = 2 \times 8^3 + 1 \times 8^2 + 7 \times 8^1 + 3 \times 8^0$

$= 1024 + 64 + 56 + 3$

$= (1147)_{10}$

$\therefore (2173)_8 = (1147)_{10}$

Ans to the or no 4

Decimal to Hexadecimal :

$$
\begin{array}{r|l|l}
16 & 513 & \\
16 & 32 & 1 \text{ (LSB)} \\
16 & 2 & 0 \\
 & 0 & 2 \text{ (MSB)}
\end{array}
$$

$$(513)_{10} = (201)_{16}$$

Ans to the qr no 5

Binary to hexa decimal :

we can complete this conversion in two steps :

Given , $(101101110)_2$ to decimal :

$$(101101110)_2 = 1\times2^8+0\times2^7+1\times2^6+1\times2^5+0\times2^4+1\times2^3$$
$$+1\times2^2+1\times2^1+0\times2^0$$
$$= 256+0+64+32+0+8+4$$
$$+2+0$$
$$= (366)_{10}$$

Now, $(366)_{10}$ to hexadecimal :

$(366)_{10}$:

16	366	
16	22	E (LSB)
16	1	6
	0	1 (MSB)

$\therefore (366)_{10} = (16E)_{16}$

Therefore, $(101101110)_2 = (16E)_{16}$

Ans to the qr no 6(a)

convertion to do : $(29)_{10} = (?)_7$

$$\begin{array}{r|l} 7 & 29 \\ \hline 7 & 4 - 1 \text{ (LSB)} \\ \hline & 0 - 4 \text{ (MSB)} \end{array}$$

$\therefore (29)_{10} = (41)_7$

Ans to the qr no 6(b)

convertion to do : $(10110111)_2 = (?)_4$

Binary to decimal :

$(10110111)_2 = 1\times2^7 + 0\times2^6 + 1\times2^5 + 1\times2^4 + 0\times2^3 +$
$1\times2^2 + 1\times2^1 + 1\times2^0$

$= 128+0+32+16+0+4+2+1$

$= (183)_{10}$

Now, converting the decimal number

$(183)_{10}$ to base 4 :

$$
\begin{array}{r|l}
4 & 183 \\ \hline
4 & 45 - 3 \ (LSB) \\ \hline
4 & 11 - 1 \\ \hline
4 & 2 - 3 \\ \hline
 & 0 - 2 \ (MSB)
\end{array}
$$

$\therefore (183)_{10} = (2313)_4$

$\therefore (10110111)_2 = (2313)_4$

Ans to the qr no 7

Addition:

$$\begin{array}{r} (417)_8 \\ (134)_8 \\ \hline (553)_8 \end{array}$$

rough

$$8)\ 11\ (1$$
$$\underline{8}$$
$$3$$

varification:

$(417)_8 = 4\times8^2+1\times8^1+7\times8^0$

$= 256+8+7$

$= (271)_{10}$

$(134)_8 = 1\times8^2+3\times8^1+4\times8^0$

$= 64+24+4$

$= (92)_{10}$

$(553)_8 = 5\times8^2+5\times8^1+3\times8^0$

$= (363)_{10}$

Now, $(271)_{10}+(92)_{10} = (363)_{10}$

$\therefore (417)_8+(134)_8 = (553)_8$ is varified.

substraction :

$$\begin{array}{r} {\scriptstyle 3\ \ 9} \\ (417)_8 \\ -\ (134)_8 \\ \hline (263)_8 \end{array}$$

$\therefore (417)_8 - (134)_8 = (263)_8$

varification :

$(417)_8 = (271)_{10}$

$(134)_8 = (92)_{10}$

$\therefore (271)_{10} - (92)_{10} = (179)_{10}$

Now, $(263)_8 = 2\times8^2 + 6\times8^1 + 3\times8^0$

$= 128 + 48 + 3$

$= (179)_{10}$

$\because (263)_8 = (179)_{10}$

$\therefore$ The substraction is varified.

Multiplication :

$$
\begin{array}{r}
(417)_8 \\
\times\ (134)_8 \\
\hline
2074 \\
1955\times \\
417\times\times \\
\hline
(60544)_8
\end{array}
$$

rough

$$
8)\,28\,(3 \quad \underline{24} \quad 4
$$

$$
8)\,16\,(2 \quad \underline{16} \quad 0
$$

$$
8)\,21\,(2 \quad \underline{16} \quad 5
$$

$$
8)\,12\,(1 \quad \underline{8} \quad 4
$$

$$
8)\,13\,(1 \quad \underline{8} \quad 5
$$

$$
8)\,13\,(1 \quad \underline{8} \quad 5
$$

$\therefore (417)_8 \times (134)_8 = (60544)_8$

Varification :

$(417)_8 = (271)_{10}$, $(134)_8 = (92)_{10}$

Now,

$$
\begin{array}{r}
(271)_{10} \\
\times (92)_{10} \\
\hline
542 \\
2439\times \\
\hline
(24932)_{10}
\end{array}
$$

$\therefore (271)_{10} \times (92)_{10} = (24932)_{10}$

Now,

$$(60544)_8 = 6\times8^4 + 0\times8^3 + 5\times8^2 + 4\times8^1 + 4\times8^0$$

$$= 24576 + 0 + 320 + 32 + 4$$

$$= (24932)_{10}$$

since $(60544)_8 = (24932)_{10}$

And, $(271)_{10} \times (92)_{10} = (24932)_{10}$

$\therefore$ The multiplication is varified.

Ans to the q no 8

Given eight bit one's compliment number is, $(01000010)_{1's}$

The MSB of the number is 0 which means it is a positive number.

$$(01000010)_{1's} = +(01000010)_2$$

Converting $(01000010)_2$ to decimal :

$$(01000010)_2 = 0\times2^7 + 1\times2^6 + 0\times2^5 + 0\times2^4 + 0\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0$$

$$= 64 + 2 = (66)_{10}$$

$$\therefore (01000010)_{1's} = (+66)_{10}$$

Ans to the qr no 9

Given two's compliment number $= (10111100)_{2's}$

Since the MSB is 1, this is a negative number.

Performins 2's compliment on the number to get it's magnitude:

$$(10111100)_{2's}$$

$$(01000011)_{1's}$$

$$+1$$

$$(01000100)_{2's}$$

$(01000100)_{2's} = +(01000100)_2$

$(01000100)_2 = 0\times2^7+1\times2^6+0\times2^5+0\times2^4+0\times2^3+$
$1\times2^2+0\times2^1+0\times2^0$

$= 64+4 = (68)_{10}$

Now,

$(10111100)_{2's} = -(01000100)_2$

$= -(68)_{10}$

$\therefore$ converted decimal number $= -(68)_{10}$

<u>Ans to the qr no 10</u>

using sum of weights method,

	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	512	256	128	64	32	16	8	4	2	1
91=	0	0	0	1	0	1	1	0	1	1
499=	0	1	1	1	1	1	0	0	1	1
379=	0	1	0	1	1	1	1	0	1	1
98=	0	0	0	1	1	0	0	0	1	0

a

$91 - 499 = 91 + (-499)$

$(+91)_{10} = (0001011011)_{2's}$

$(+499)_{10} = (0111110011)_2$

Performing 2's compliment on (+499) we get,

$(-499)_{10} = (1000001101)_{2's}$

Addition :

$$
\begin{array}{rl}
(+91)_{10} = & (0001011011)_{2's} \\
(+)\ (-499)_{10} = & (1000001101)_{2's} \\
\hline
(-408)_{10} = & (1001101000)_{2's}
\end{array}
$$

since, MSB of both adding numbers are diffrent and MSB of resultant number is also negative, there is no overflow

∴ There is no overflow.

(b)

$(+379)_{10} = (0101111011)_{2's}$

$(+98)_{10} = (0001100010)_{2's}$

Addition :

$$
\begin{array}{rl}
(379)_{10} = & (0\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 1)_{2's} \\
(+)\ (98)_{10} = & (0\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 1\ 0)_{2's} \\
\hline
(477)_{10} = & (0\ 1\ 1\ 1\ 0\ 1\ 1\ 1\ 0\ 1)_{2's}
\end{array}
$$

since, the resultant number's MSB is the same as the two adding numbers, there is no overflow.

$\therefore$ There is no overflow.

Ans to the qr no 11

cost of ram = $(1C2)_{16}$ \$

cost of graphics card = $(10010110000)_2$

$$(1C2)_{16} = 1\times16^2 + C\times16^1 + 2\times16^0$$
$$= 256 + 192 + 2$$
$$= (450)_{10}$$

$$(10010110000)_2 = 1\times2^{10} + 0\times2^9 + 0\times2^8 + 1\times2^7 + 0\times2^6 + 1\times2^5$$
$$+ 1\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 0\times2^0$$
$$= 1024 + 128 + 32 + 16$$
$$= (1200)_{10}$$

Total cost $= (2\times450 + 1200)_{10}$
$= (2100)_{10}$ \$

My friend gave $(4069)_8$ \$

$$(4064)_8 = 4\times8^3 + 0\times8^2 + 6\times8^1 + 4\times8^0$$
$$= 2048 + 48 + 4$$
$$= (2100)_{10}$$

Performing ~~s~~ubstraction :

cost of components $= (2100)_{10}$

received money $= -(2100)_{10}$

$$(0)_{10}$$

$\therefore$ No dollars will be left after buying those components