NAME: Hassan Ali
ROLL NO: 20P-0149
Section: 2C
Assignment NO: 2

Q1 complete the table

Decimal	BCD	HexaDecimal	Octal
98	10011000	$(62)_{16}$	$(230)_8$
98	10011000	$(62)_{16}$	$(230)_8$
1467	0001010001100 11	$(5BB)_{10}$	2673
43981	01000011100110000001	ABCD	(125715)

Q2 Multiply

i) 01101010 by 11110001

sol: Taking 2^s compliment = 00001111

11110001 = 00001111

```
  106
  x15
 1590 ANS
```

sol:

```
        0 1 1 0  1 0 1 0
        0 1 1 0  1 1 1 1
        ----------------
        0 1 1 0  1 0 1 0
      0 1 1 0 1  0 1 0 x
      ------------------
      1 0 0 1 1  1 1 1 0
    0 1 1 0 1 0  1 0 x x
    --------------------
    1 0 1 1 1 0  0 1 1 0
  0 1 1 0 1 0 1  0 x x x
  ----------------------
  1 1 0 0 0 1 1  0 1 1 0   ANS
```

Check :-

$1024 + 512 + 0 + 0 + 32 + 16 + 0 + 4 + 2 + 0$

590 - Ans -

ii) 219 by 15

$219 = (11011011)_2$

$15 = (00001111)_2$

$$\begin{array}{r} 219 \\ \times 15 \\ \hline 3285 \end{array}$$

$$\begin{array}{r}
11011011 \\
00001111 \\
\hline
11011011 \\
11011011\times \\
\hline
1010010001 \\
11011011\times\times \\
\hline
10111111101 \\
11011011\times\times\times \\
\hline
110011010101
\end{array}$$

8)

Ans -

Check

$2048 + 1024 + 0 + 0 + 128 + 64 + 0 + 16 + 0$
$+ 4$

3285 Ans

Q3 Divide

i) 10001000 by 00100010

Taking 2's compliment
= $(11011110)_2$

	10001000	Q:	00000000
	11011110		+1
1)	01100110		00000001
	11011110		+1
1)	01000100		00000010
	11011110		+1
1)	00100010		00000011
	11011110		+1
1)	00000000		00000100

Ans

ii) -145 by 5

-145 = 10010001
5' = 1111011 after 2's compliment

	10010001	Q:-	00000000
	1111011		+1
1)	10001100		00000001
	1111011		+1
1)	10000111		00000010
	1111011		+1
1)	10000010		00000011
	1111011		+1
			00000100
			+1
			00000101
			+1

Q4. Perform and verify

a) $(ABC)_{16} + (1A3)_{16}$

$= (101010111100)_2 + (000110100011)_2$

$$
\begin{array}{r}
101010111100 \\
000110100011 \\
\hline
110001011111 \\
C \quad 5 \quad F
\end{array}
$$

$(C5F)_{16}$ Ans-

Verification:-

$= (A \times 16^2 + B \times 16^1 + C \times 16^0) + (1 \times 16^2 + A \times 16^1 + 3 \times 16^0)$

$= (10 \times 256 + (11 \times 16) + 12 \times 1) + (256 + 160 + 3)$

$= (2560 + 176 + 12) + (419)$

$= 2748 + 419$

$= (3167)_{10}$

Change to binary

$(\underline{1100}\,\underline{0101}\,\underline{1111})_2$

$\quad C \quad 5 \quad F$

$= (C5F)_{16}$ Ans Verified -

b) $(F1)_{16} - (A6)_{16}$

sol: $(F1)_{16} = (11110001)_2$

$(A6)_{16} = (10100110)_2$

2^s compliment $(A6)_{16}$

$= (01011010)_2$

$$\begin{array}{r} 11110001 \\ 01011010 \\ \hline 1)\ 01001011 \end{array}$$ ANS

$= (01001011)_2 = 75$ ANS

$(4\ B)_{16}$

Verification:

$(F1)_{16} = 241$

$(A6)_{16} = \underline{166}$

75 ANS

$= (4B)_{16}$

c) $(110)_{10} - (84) = (?)_2$

sol: $(110)_{10} = (1101110)_2$

$84 = (1010100)_2 = 0101100$ 2^{cs} compliment

$$\begin{array}{r} 1101110 \\ 0101100 \\ \hline)0011010 \end{array}$$

$\Rightarrow (0011010)_2$

$\Rightarrow 26$

Verification:

$$\begin{array}{r} 110 \\ -84 \\ \hline 26 \end{array}$$ ANS

Scanned with CamScanner

Q5:

ANS The gray rode makes only one bit change at one time when going from one number to an other next number if it's in sequence-

→ Gray Code for $(1111)_2 = 1000$

→ Gray code for $(0000)_2 = 0000$

It can be shift be proved by a shaft shifter example an other multipe examples-