NAME Muhammad ilyas

ID NO 15392

Degree B.S (software engr)

Teacher Sir M. Amin

Assignment DLD

Assignment 1

Q1:- What is the weight of 7 in 1799_{10}?

Sol:-

$(1\times10^3)+(7\times10^2)+(9\times10^1)+(9\times10^0)$

$1000 + 700 + 90 + 9$

weight of 7 in 1799 is 700

Q2:- Give the value of each digit in $(5436)_{10}$?

Sol:-

$(5\times10^3)+(4\times10^2)+(3\times10^1)+(6\times10^0)$

$500 + 400 + 30 + 6$

value of 5 is = 500

value of 4 is = 400

value of 3 is = 30

value of 6 is = 6

Q3:- Convert the following

(a) $(11111111)_2 = (?)_{10}$

$\Rightarrow (1\times10^7)+(1\times10^6)+(1\times10^5)+(1\times10^4)+(1\times10^3)+(1\times10^2)+(1\times10^1)+(1\times10^0)$

$\Rightarrow 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1$

$(255)_{10}$ Ans

(b) $(127)_{10} = (?)_2$

Sol:- using Repeated division by 2

2	127	
2	63	— 1
2	31	— 1
2	15	— 1
2	7	— 1
2	3	— 1
	1	— 1

$(1111111)_2$ Ans

(C):- $10000000.1010_2 = (?)_{10}$

Sol:- $(1\times 2^{7}) + (1\times 2^{-1}) + (1\times 2^{-3})$

$128 + 0.5 + 0.125$

$\Rightarrow (128.625)_{10}$ Ans

(e):- $(4D7F)_{16} = (?)_{10}$

Sol:-

$(4\times 16^{3}) + (13\times 16^{2}) + (7\times 16^{1}) + (15\times 16^{0})$

$16384 + 3328 + 112 + 5$

$(19839)_{10}$ Ans.

(f) :- $(128)_{10} = (?)_{16}$

Sol:-

$$\begin{array}{l|l} 16 & 128 \\ & 8 - 0 \end{array}$$

$(128)_{10} = (80)_{16}$ Ans.

(g) :- $(3A6F)_{16} = (?)_2$

Sol:- using hexa - Binary Table

3	A	6	F
0011	1010	0110	1111

$(0011101001101111)_2$ Ans.

(h) :- $(1100001111100101)_2 = (?)_{16}$

Sol:-

1100	0011	1110	0101
C	3	E	5

$\Rightarrow (C3E5)_{16}$ Ans

(i) :- $(6173)_8 = (?)_{10}$

Sol:-

$$(6 \times 8^3) + (1 \times 8^2) + (7 \times 8^1) + (3 \times 8^0)$$

$$3072 + 64 + 56 + 3$$

$\Rightarrow (3195)_{10}$ Ans.

(j):- $(169)_{10} = (?)_8$

Sol:- using Repeated division

$$\begin{array}{r|l} 8 & 169 \\ \hline 8 & 21 - 1 \\ 8 & 2 - 5 \end{array}$$

$\Rightarrow (251)_8$ Ans

(K):- $(3740)_8 = (?)_2$

Sol:- By Octal-Binary Table

3 7 4 0

011 111 100 000

$\Rightarrow (011111100000)_2$ Ans

(L):- $(1010110001011111)_2 = (?)_8$

Sol:-

001 010 110 001 011 111

1 2 6 1 3 2

$\Rightarrow (126132)_8$ Ans

(M):- $(7503)_8 = (?)_{16}$

Sol:- 7 5 0 3

111 101 000 011

Now using Group of 4

1110 0100 0011

F 4 3

$\Rightarrow (F43)_{16}$

Scanned with CamScanner

(N):- $(2A7D)_{16} = (?)_8$

Sol:- using hexa - Binary Table

2 A 7 D

0010 1010 0111 1101

Now using group of 3

000 010 101 001 111 101

0 2 5 1 7 5

$= (25175)_8$ Ans.

(O):- $(-12)_{10} = (?)_2$ using 2's compliment

Sol:-

2	12	
2	6	0
2	3	0
	1	1

$(1100)_2$

Now Take 2's complement

00001100

11110011 → 1's compl.

1 → 2's com.

11110100

$(11110100)_2$ Ans.

(P):- $(11111111)_2 = \pm(?)_{10}$ 2's complent

Sol:- using weighted notatation of the magnitude Bits.

$(1\times2^6)+(1\times2^5)+(1\times2^4)+(1\times2^3)+(1\times2^2)+(1\times2^1)+(1\times2^0)$

$64 + 32 + 16 + 8 + 4 + 2 + 1$

$= 127$

since the sign-bit is 1

so

$\Rightarrow (-127)_{10}$ Ans.

(G):- $(156)_{10} = (?)_{BCD}$

Sol:- using Deci - BCD Table

1	5	6
0001	0101	0110

$(0001\ 0101\ 0110)_{BCD}$ Ans.

(R):- $1000001110000_{BCD} = (?)_{10}$

Sol:-

1000	0111	0000
8	7	0

$\Rightarrow (870)_{10}$ Ans

(S):- $(1001010)_2 = (?)_{gray}$

$1 \rightarrow + 0 \rightarrow + 0 \rightarrow + 1 \rightarrow + 0 \rightarrow + 1 \rightarrow + 0$

$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$

$1 \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1$

$\Rightarrow (1101111)_{Gray}$ Ans

(T):- $(1010111)_{Gray} = (?)_2$

$1 \quad 0 \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1$

$1 \quad 1 \quad 0 \quad 0 \quad 1 \quad 0 \quad 1 \quad 0$

$(11001010)_2$ Ans.

(U):- $01000000 = (?)_{ASCII - small}$

Sol:- Using ASCII Table

$(1 \times 2^6) + (1 \times 2^0)$

$64 + 1$

$(65)_{10} = A$ ASCII Chracter.

(V):- $(0110\ 0000)_2 = (?)_{ASCII - capital}$

Sol:- $(1 \times 2^6) + (1 \times 2^5)$

$64 + 32$

$(96)_{10} = (\ '\ )_{ASCII capital}$

Ans.

Scanned with CamScanner

(w):- 111000 = (? 111000) Even parity

Sol:- For Even parity

111000 = (1 111000) Even parity

The number of 1s must be Even

(x):- 101101 = (? 101101) ~~even~~ odd parity

For odd parity

101101 = (1101101) odd parity

As number of ones must be odd.

* ——— * ——— * ——— *

Q: 4:- Calculate each of the following.

(a) 11110011 + 01011111

Sol:-

$$\begin{array}{r} 11110011 \\ +\ 01011111 \\ \hline 1\ \ 01010010 \end{array}$$

$(01010010)_2$ Ans.

(b):- 10000000 − 01111111

Sol:- Taking 2's complement of subtracted

$$\begin{array}{r} 01111111 \\ 10000000 \\ +\ \ \ \ \ \ \ \ \ 1 \\ \hline 10000001 \end{array}$$

Now

$$\begin{array}{r} 10000000 \\ +\ 10000001 \\ \hline 00000001 \end{array}$$

Discard 1

$\Rightarrow (00000001)_2$ Ans.

Scanned with CamScanner

(c):- $(1100)_2 \times (1100)_2$

Sol:-

$$
\begin{array}{r}
11 \\
\times\ 1100 \\
\hline
00 \\
+\ 00 \\
111 \\
11 \\
\hline
10010000
\end{array}
$$

10010000 Ans.

(d):- $(1100)_2 \div 10_2$

Sol:-

$$
\begin{array}{r}
110 \\
10 \enclose{longdiv}{1100} \\
10 \\
\hline
100 \\
10 \\
\hline
00 \\
00 \\
\hline
\times
\end{array}
$$

$(110)_2$ Ans.

(e):- $(01111111)_2 - (00000111)_2$

Sol:- Take 2's complement of subtracter

$$
\begin{array}{r}
00000111 \\
11111000 \\
+\ 1 \\
\hline
11111001
\end{array}
$$

Now

$$
\begin{array}{r}
01111111 \\
+\ 11111001 \\
\hline
01111000
\end{array}
$$

Discard carry 1

(01111000) Ans.

(f):- 01101010 x 11110001

Sol:- Taking 2's complement

```
   11110001
 + 00001110
          1
 ----------
   00001111
```

Now

```
              00001111
              01101010
              --------
              00000000
            00001101x
          0000000000xx
        0000111111xxx
      00000000000xxxx
    00001111xxxxx
  000011111xxxxxx
0000000000xxxxxxx
-------------------------
00001100011010110
```

Takes 2's complement again

```
   1100011 0110
 + 0011100 1001
              1
 --------------
   0011100 1010
```

$\Rightarrow$ (111001010). Ans

(g) : $(10001000)_2 \div (00100010)_2$

Sol:- Take 2's complement.

$$\begin{array}{r} 00100010 \\ 11011101 \\ +\quad\quad 1 \\ \hline 11011110 \end{array}$$

Qouetient = 00000000

Subtracting diviser from divident with 2's complent

$$\begin{array}{r} 10001000 \\ +\ 11011110 \\ \hline \text{Discard carry } ①\ 01100110 \end{array}$$

Add 1 to the Quentient = 00000001

subtracting diviser from first partial remainder

$$\begin{array}{r} 01100110 \\ +\ 11011110 \\ \hline \text{Discard carry } ①\ 01000100 \end{array}$$

Add 1 to the Qouetient = 00000010

$$\begin{array}{r} 00100100 \\ +\ 11011110 \\ \hline \text{Discard carry } ①\ 00100010 \end{array}$$

add 1 to the Qouentient = 00000010

$$\begin{array}{r} 00100010 \\ +\ 11011110 \\ \hline \text{Discard carry } ①\ 00000000 \end{array}$$

Add 1 to the Qouentient = 00000100

Answer

Scanned with CamScanner

(h):- $FC_{16} + AE_{16}$

Sol:-

$$\begin{array}{r} F\ C \\ +\ A\ E \\ \hline 1\ A\ A \end{array}$$

(1 AA) Ans.

(i):- $F1_{16} - A6_{16}$

Sol:- Using 2's complement.

A 6

1010 0110

10100110

+01011001

01011010 → 2's complement

F C

1111 1100

Now

$$\begin{array}{r} 1111\ 1100 \\ +\ 0101\ 1010 \\ \hline 1\ 0101\ 0110 \end{array}$$

0101 0110

5 6

⟹ (56) Answer.

Q5: Apply modulo-2 to $1100_2 + 1011_2$

Sol:-

```
 1100
 1011
 ----
 0111   => 0111 Ans.
```

Q6: Apply CRC to the data bits 10110010_2 using generator code 1010_2

Sol:- D = ~~11001~~ 10110010

G = 1010

D' = 110100110000

using module-2 opperation

```
D'/G = 110100110000
       1010
       ----
       1110
       1010
       ----
       1000
       1010
       ----
       1011
       ~~~~1011
       ----
```

```
11010011000
1010
----
1110
1010
----
1000
1010
----
  1011
  1010
  ----
    1000
    1010
    ----
    100        non-zero
```

Again by adding remainder to data bits

```
110100110100
1010
----
1110
1010
----
1000
1010
----
  1011
  1011
  ----
    1010
    1010
    ----
       0
```

Hence 11010011010 is Trasmited CRC

Q7:- Asume that the code produced in Q.6 incurs an error in the most significant bit during transmittion. Apply CRC to detect the error

Sol:-

$D' = 010100110100$

$G = 1010$

using module-2 opperation

```
0101001101 00
1010
----
1111
1010
----
 1010
 1010
 ----
     0110
     1010
     ----
     1100
     1010
     ----
      1101
      1010
      ----
       1110
       1010
       ----
        1000
        1010
        ----
          10  -> is not equal to zero
```

hence error is detected.

Ans.