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Assignment No # 1

Submitted to

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Q1) What is the weight of 7 in 1799?

Sol/ Weighted form

$(1 \times 10^3) + (7 \times 10^2) + (9 \times 1$

$+ (9 \times 10^0)$.

$1000 + 700 + 90 + 9$

The weight of 7 in 1799 is 100.

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

Sol/ weighted form

(2)

$(5 \times 10^3) + (4 \times 10^2) + (3 \times 10^1)$

$+ (6 \times 10^0)$

5000 , 400 , 30 , 6

v of 5 = 5000

v of 4 is 400

v of 3 = 30

v of 6 is = 6

(iii) Convert the following

(a) $11111111111_{(2)} = (?)_{10}$

Sol/ we us weighted

Notation for this

(3)

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

128 , 64 , 32 , 16, 8

4 , 2 , 1

255_{10} Ans

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

Repeated division by 2.

2	127 – 0
2	63 – 1
2	31 – 1
2	15 – 1
2	7 – 1
2	3 – 1

(4)

$= (01111111)_2$ Ans

(c) $45.25_{(10)} = (?)_2$

Sol/ Repeated division

2	45
2	22 – 1
2	11 – 0
2	5 – 1
2	2 – 1
2	1 – 0

$45_{10} = (101101)_2$

Now we us Repeated Multiplication for dec part.

$0.25 \times 2 = 0.50 \rightarrow 0$

$0.50 \times 2 = 1.00 \rightarrow 1$

$45.25_{(10)} = (101101.01)_2$

(5)

(d) $11000000.1010_{(2)} = (?)_{10}$

Sol/ we using weighted notation for this process

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

$128 + 0.5 + 0.125$

$128.625_{(10)}$ Ans

(e) $4DFF_{(16)} = (?)_{10}$

Sol/ we use weighted notation for this process.

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

$= 384 + 3328 + 112 + 15$

6

(19839)10

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

Repeated division by 16

16	128
16	8 - 0

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

(g) $3Abf_{(16)} = (?)_2$

Sol/ we use hex-binary table

$\frac{3}{0011} + \frac{A}{1010} + \frac{b}{0110} + \frac{f}{1111}$

$0011\ 1010\ 0110\ 1111_{(2)}$

(7)

(h) 1100001111001010 (2) = (?)16

Sol/ We use four group's

1100 , 0011 , 1110 | 0101

C 3 E 5 (16) Ans

(i) 61733 (8) = (?)10

Sol/ Weighted Method

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

3072 + 64 + 56 + 3

61783 (8) = 3195 (10)

(j) 169 (10) = (?)8

8	169
8	21 - 1
8	2 - 5

(251)8 Ans

(8)

(o) 11111111 (2) = ± (?)10

sol/ 2's complement

```
  1 1 1 1 1 1 1 1
+ 0 0 0 0 0 0 0 0   1's comp
                  + 2's comp
  ---------------
  0 0 0 0 0 0 0 0
```

Signed bit is zero

(1x1°) = +1 (10)

P) -12₁₀ = (?)2

first we take 2

2	12
2	6 — 0
2	3 — 0
2	1 — 1

12 = 1100 (2)

9

Now take 2's complement

00001100

11110011 is complement

\+ 1 2's complement

11110100 (2)

(c) 156(10) = (?)BCD

Now Decimal to BCD table

1 + 5 + 6

0001 0101 0110

0001 0101 0110 BCD Ans

(d) 100000111 0000 BCD = (?)10

Now BCD to Decimal table

1000 0111 0000

8 7 0

870 (10) Ans

(10)

(5) 1001010 (2) = (?) Grey

Sol/ 1 → + 0 → to → + 1 → to
↓ + 1 → to

1 1 0 1 1

= 1101111 Gray

(T) 1010 1111 Gray = (?)2

Sol/ 1 0 1 0 1 1 1 1
1 1 0 0 1 0 1 0

1100 1010 (2)

(4) 01000000 = (?) Ascii small

Ascii table

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

64 + 1 = 65 (10)

$65_{(10)}$ = Ascii

(v) 0110 0000 = (?) Ascii Sup.(n)

Sol/ Ascii table

$(1 \times 2^6) + (1 \times 2^5)$

$64 + 32$

$= 96_{(10)}$

$96_{(10)}$ = (') Ascii

(vi) 111 000 = (?) 111000) Even parity

Now Even parity

111 000 = (1 111000)

↓

Even parity

↑ must be Even

(12)

Q2) Calculate each of the following.

(a) $11110011_{(2)} + 01011111_{(2)}$

Sol/

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

↓ Discarded bit

$01010010_{(2)}$ Ans

(b) $10000000 - 01111111$

2's compliment

$$\begin{array}{r} 01111111 \\ +\ 10000000 \quad \text{1's compl} \\ +\ \quad\quad\quad\ 1 \quad \text{2's compl} \\ \hline 10000001 \end{array}$$

P.T.O

```
 1 0 0 0 0 0 0 0
 1 0 0 0 0 0 0 1
-----------------
1 0 0 0 0 0 0 0 0
```

↳ Discarded bit

00000000 Ans

(e) 1100(2) × 11(2)

```
    11
  × 1100
  ------
    00
   00
+ 111
  11
------
100100
```

Ans

(d) $1100_{(2)} \div 10_{(2)}$

$$
\begin{array}{r}
110 \\
10\overline{)1100} \\
10 \\
\hline
100 \\
10 \\
\hline
00 \\
00 \\
\hline
\times
\end{array}
$$

(110) Ans

(e) $011111111_{(2)} - 000000111_{(2)}$

2's complement

```
0 0 0 0 0 1 1 1
1 1 1 1 1 0 0 0   1's compl
                +1  2's compl
---------------
1 1 1 1 1 0 0 1
```

0 1 1 1 1 1 1 1 1
1 1 1 1 1 1 0 0 0
1 0 1 1 1 1 0 0 0

↓ Discarded but

0 1111 000 (2) Ans

(f) 011 0 1 0 1 0 (2) X 1111 0 0 0 1 (2)

Sol/ taking 2's complement

1 1 1 1 1 0 0 0 1
0 0 0 0 1 1 1 0 1's complement
1 2's complement
0 0 0 0 1 1 1 1

0 0 0 0 1 1 1 1
0 1 1 0 1 0 1 0
0 0 0 0 0 0 0 0
0 0 0 0 1 1 1 1 X
0 0 0 0 0 0 0 0 X X
0 0 0 0 1 1 1 1 X X X
0 0 0 0 1 1 1 1 X X X X

0 0 0 0 | | | | x x x x x
0 0 0 0 | | | | x x x x x
0 0 0 0 0 0 0 0 x x x x x

0 0 0 0 | | 0 0 0 | | 0 | | 0

Taking 2's complement

| | 0 0 0 | | 0 | | 0
0 0 | | | | 0 0 | 0 0 | | 1's com
+ 2's com

0 0 | | | 0 0 | 0 | 0

| | | 0 0 | 0 | 0 Ans

(2)

(a) $FC_{16} + AE_{16}$

F C
A E
---
1 A A Ans

P.T.O

ii) $F1_{16} - A6_{16}$

Sol: Using 2's complement

A 6

1010 0110

1010 0110

0101 1001 2's complement

+ 1

0101 1010

F 1 E

1111 1110

1111 1110

+ 0101 1010

1 0101 1000

↓

Discarded

0101 0110

5 6

56 Ans

(K) 0001 0110 BCD + 0001 0101 BCD

```
  0001      0110
  0001      0101
  ----      ----
  0010      1010
                ↳ Invalid
                  to (19)
```

Add 6 to invalid

```
  0010      1010
                0110
  ----      ----
  0011 0000   Ans
```

(05) Apply modulo - 2 to 1100_2

$+ \ 1011_2$

Sol/

```
  1101
  1011
  ----
  0111   Ans
```

(06) Apply CRC to the Data bits using generator code $1010_{(2)}$

Sol/ $D = 11010011_2$

$G = 1010$

$D = 11010011 0000$

Now modulo-2 operation

$D' = 11010011 0000$

$G \quad 1010$

1110
1010
1000
1010
1011
1010
1000
1010
100 — Zero

20

Again by add to remainder bits

```
1101001100100
 1010
 ----
  1110
  1010
  ----
   1000
   1010
   ----
    1011
    1010
    ----
     0010
     1010
     ----
      0000
```

1101001100100 is transmitted

CRC Ans

Q7) Assume that the code produces in OS incurs error in the most significant bits Apply CRC to detect error.

Sol/ D' = 01011001100
B = 1010

Now Apply Modulo-2 operation

```
01011001100
1010
----
0001
1010
----
0011
1010
----
0010
1010
----
0000
1010
----
0010
```

Error occured ← ≠0