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Assignment No:

1

Subject:

Digital logic Design.

Submitted To:

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Q1) What is weight of 7 in 1799_{10}?

(A). $1 \times 10^3 + 7 \times 10^2 + 9 \times 10^1 + 9 \times 10^0$

$= 1000 + 700 + 90 + 9$

$= 1799.$

The weight of 7 in 1799 is 7×10^2 which is 700.

Q2) Give value of each digit 5486_{10}?

$5 \times 10^3 + 4 \times 10^2 + 3 \times 10^1 + 6 \times 10^0$

$5000 + 400 + 30 + 6.$

$= (5436)_{10}.$

5 value is 10^3, 4 value is 10^2, 3 value is 10^1, 6 value is 10^0.

Q3) Convert the following.

$(11111111)_2 = (255.)_{10}.$

$1 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$

$= (255)_{10}$

(b) $(127)_{10} = (1111111)_2$.

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

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

2	45
2	22 - 0
2	11 - 1
2	5 - 1
2	2 - 0
2	1 - 1

$.25 \times 2 = 0.50$

$0.50 \times 2 = 1.00$

(d) $10000000.1010_2 = (128.625)_{10}$.

$2 \times 1^7 + 2 \times 0^6 + 2 \times 0^5 + 2 \times 0^4 + 2 \times 0^3 + 2 \times 0^2 + 2 \times 0^1 + 2 \times 0^0$

$1 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3} + 0 \times 2^{-4}$

$= (128.)_{10}, \ (.625)_2$

(e) $4D7F_{16} = (19839.)_{10}.$

$4 \times 16^3 + 13 \times 16^2 + 7 + 16^1 + 15 \times 16^0$

$= (19839)_{10}.$

A = 10
B = 11
C = 12
D = 13

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

16	128
16	8 - 0

(g) $3A6F_{16} = (11101001101111)_2.$

First convert to decimal.

$3 \times 16^3 + 10 \times 16^2 + 6 \times 16^1 \times 15 \times 16^0$

$= (14959)_{10}.$

Convert to binary now.

2	14959
2	7479 - 1
2	3739 - 1
2	1869 - 1
2	934 - 0
2	467 - 1
2	233 - 1
2	116 - 0
2	58 - 0
2	29 - 1
2	14 - 0
2	7 - 1
2	3 - 1

(h) $1100001111100101_2 = (C3E5)_{16}$

Convert to decimal.

$2\times1^{15} + 2\times1^{14} + 2\times0^{13} + 2\times0^{12} + 2\times0^{11} + 2\times0^{10} + 1\times2^{9} + 1\times2^{8} + 1\times2^{7} + 1\times2^{6}$
$+ 1\times2^{5} + 0\times2^{4} + 0\times2^{3} + 1\times2^{2} + 0\times2^{1} + 1\times2^{0}$

$(50149)_{10}$

16	50149	- 5
16	3134	- E
16	195	- 3
16	12	- C

(i) $(6173)_8 = (3195)_{10}$

$(6\times8^3) + (1\times8^2) + (7\times8^1) + (3\times8^0)$

$3072 + 64 + 56 + 3 = (3195)_{10}$

(j) $(169)_{10} = (251)_8$

8	169	
8	21	- 1
8	2	- 5

(k) $(3740)_8 = (011111100000)_2$

3	7	4	0
011	111	100	000

(l) $(\underline{1}\,\underline{010}\,\underline{110}\,\underline{001}\,\underline{011}\,\underline{111})_2 = (126137)_8$

1 2 6 1 3 7

(m) $(2A7D)_{16} = (25175)_8$

Convert to binary

0010 1010 0111 1101

Pair of 3.

(25175)

(n) $(7503)_8 = (F43)_{16}$

111 101 000 011

Group of 4

1111 0100 0011

F 4 3.

(o) $(11111111)_2 = \pm(+1)_{10}$

2nd Compliment.

11111111

00000000

1.

0000001

(p) $(-12_{10}) = (11110100)_2$

2's complimpent.

00 00 11 00

11 11 0011

1

11110100

(q) $(156)_{10} = (0001\ 0101\ 0110)$ BCD.

1 5 6

0001 → 0101 → 0110.

(r) $(100000111\,0000) = (870.)_{10}$

(1000 0111) 0000

8 7 0

(s) $(1001010)_2 = (1101111)_{Gray}$

1 → 0 → 0 → 1 + 0 → 1 + → 0.

(1 1 0 1 1 1 1)

Scanned with CamScanner

(t) $10101111_{\text{gray}} = (\quad)_2$

1 0 1 0 1 1 1 1

$(1\ 1\ 0\ 0\ 1\ 0\ 1\ 0)_2$

(u) 01000000 = (ASCII . small,

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

$= 64 + 1 = 65 = A$.

(v) 01100000 = (?) ASCII

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

$64 + 32 = (96)_{10}$.

(w) (111000) = (?111000) even Parity.

for even Parity.

111000 = (1111000) even Parity

no of one's even.

(x) (101101) = (?101101) odd Parity

for odd Parity

101101 = (1101101) odd Parity.

As no of one's are odd.

Q2) Calculate each of following.

(a) 1111011 + 01011111

```
  1111011
+ 1011111
---------
 10101001 0
```

1 0 1 0 1 0 0 1 0. Ans.

(b) 100000000 − 01111111

011 11111
100 00000 1's compli
1
100 00000 1

Now

10 000000
+1 0000001
1 00000001 Ans.

(c) $(1100)_2 \times (11)_2$

11
+1100
00
00

111
111
(d) 1100 ÷ 10 100100.

110
10 | 1100
10
100
10
00
00
x.

(e) 01111111 − 00000111
2's compliment.
00000 111
11111 000
1
11111 001

$(0\ 1111000)_2$ Ans.

(f) 01101010 x 11110001

2nd compliment.

1111 0001

0000 1110 1's compl:

1 2's compl.

0000 1111

11 000 110110

00111 001001 1's compl

1 2nd "

00111 001010 Ans.

(g) 10001000 ÷ 00100010.

10001000

11011110

101100110.

0100100

1101110

10010010.

Now, 0010010

11 01110

00000100 Ans

(h) $FC_{16} + AE_{16}$.

FC

AE

1AA.

(i) $F1_{(10)} - A6_{(10)}$

A 6

1010 0110.

F C

1111 1100.

(56.) Ans

(j) $6D_{16} - 3F_{16}$.

3 F
0011 1111

00 111111
11 000000
1 2nd comp

11 000001

6 D
0110 1101.

0010 1110
2 E (2E) Ans.

(K) 00010110 + 00010101.

0001 0110
0001 0101

0010 1010 invalid

Add 6 to code

0010 1010
0110

0010 0001 Ans

(Q5) Apply Moduls 2 to 1100_2 to $(1011)_2$

1101
1011

0111 Ans.

Q6) Apply CRC to Data bits 1011000100_2 using generator code.

D = 11010011
G = 1010
D' = 11010011000

using modulus 2 operation

```
11010011000 0
1010
----
 1110
 1010
 ----
  1000
  1010
  ----
   1011
   1010
   ----
    1000
    1010
    ----
     100   - non-zero.
```

```
11010011 0100
1010
----
 1110
 1010
 ----
  1000
  1010
  ----
   1011
   1010
   ----
    1010
    1010
    ----
       0
```

hence 110100110100 is CRC.

Q7) Assume that code produced in Q5 incurs an error in m.s.b. Apply CRC to detect error

data = D' = 0101 0011 0100

B = 1010.

modulus 2 operation.

```
0101 00110100
 1010
 1111
 1010
  1010
  1010
     0110
     1010
     1100
     1010
      1101
      1010
       1110
       1010
        1000
        1010
          10   ≠ 0
```

error occured.