CLO#01 ASSIGNMENT #1

21K-3210
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1:) Give the value of each digit in the following decimal numbers:

(a) 6345

Place	Thousands	Hundred	Tens	Ones
Digit	6	3	4	5
Multipliers	1,000	100	10	1
Place Value	6,000	3,00	40	5

Value of 6 = 6*1000 = 6000
Value of 3 = 3*100 = 300
Value of 4 = 4*10 = 40
Value of 5 = 5*1 = 5

(b.) 278536

Places	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
Digits	2	7	8	5	3	6
Multipliers	100,000	10,000	1,000	100	10	1
Place Value	200,000	70,000	8,000	500	30	6

Value of 2 = 2*100,000 = 200,000
Value of 7 = 7*10,000 = 70,000
Value of 8 = 8*1000 = 8,000
Value of 5 = 5*100 = 500
Value of 3 = 3*10 = 30
Value of 6 = 6*1 = 6

2.) Convert the following binary numbers into decimal:

(a.) 101110001

$\Rightarrow 1\times2^8 + 1\times2^7 + 1\times2^6 + 1\times2^5 + 1\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 1\times2^0 \Leftarrow$

$\Rightarrow 256 + \overset{0}{\cancel{128}} + 64 + 32 + 16 + 0 + 0 + 0 + 1$

$\Rightarrow \boxed{369}$

$(101110001)_2 \rightarrow (369)_{10}$

(b.) 10110011

$\Rightarrow 1\times2^7 + 0\times2^6 + 1\times2^5 + 1\times2^4 + 0\times2^3 + 0\times2^2 + 1\times2^1 + 1\times2^0$

$\Rightarrow 128 + 0 + 32 + 16 + 0 + 0 + 2 + 1$

$\Rightarrow \boxed{179}$

$(10110011)_2 \rightarrow (179)_{10}$

3.) Convert each binary number to decimal

(a.) 1011110.1010

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

$+ (1\times2^{-1}) + (0\times2^{-2}) + (1\times2^{-3}) + (0\times2^{-4})$

$\Rightarrow 64 + 0 + 16 + 8 + 4 + 2 + 0 + \frac{1}{2} + 0 + \frac{1}{8} + 0$

$\Rightarrow \boxed{94.625}$

$(1011110.1010)_2 \rightarrow (94.625)_{10}$

(b.) 1111101.11011

$\cancel{\Rightarrow 1\times2^{4} + 1\times2^{6} + 1\times2^{5} + 1\times2^{4} + 1\times2}$

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

$+ (1\times2^{-1}) + (1\times2^{-2}) + (0\times2^{-3}) + (1\times2^{-4}) + (1\times2^{-5})$

$\Rightarrow 64 + 32 + 16 + 8 + 4 + 0 + 1 + \frac{1}{2} + \frac{1}{4} + 0 + \frac{1}{16} + \frac{1}{32}$

$\Rightarrow \boxed{125.84375}$

$(1111101.11011)_2 \rightarrow (125.84375)$

4.) Convert each decimal fraction to binary using
multiplication by 2

(a.) 0.3456

$$(0.3456)_{10} \rightarrow (0.0101)_2$$

$0.3456 \times 2 = 0.6912$

$0.6912 \times 2 = 1.3824$

$0.3824 \times 2 = 0.7648$

$0.7648 \times 2 = 1.5296$

(b.) 0.9232

$0.9232 \times 2 = 1.8464$

$$(0.9232)_{10} \rightarrow (0.1110)_2$$

$0.8464 \times 2 = 1.6928$

$0.6928 \times 2 = 1.3856$

$0.3856 \times 2 = 0.7712$

5.) Convert each decimal number to binary using repeated division by 2

(a.) 47

2	47
2	$23 \rightarrow 1$
2	$11 \rightarrow 1$
2	$5 \rightarrow 1$
2	$2 \rightarrow 1$
	$1 \rightarrow 0$

$$(47)_{10} \rightarrow (101111)_2$$

(b.) 63

2	63
2	$31 \rightarrow 1$
2	$15 \rightarrow 1$
2	$7 \rightarrow 1$
2	$3 \rightarrow 1$
	$1 \rightarrow 1$

$$(63)_{10} \rightarrow (111111)_2$$

6.) Determine the 1's complement of each binary number

a.) $(1001110)_2 \rightarrow (78)_{10}$

01001110 ; Original

$\boxed{10110001 \text{ ; 1's Complement}}$

b.) $(101110101)_2 \rightarrow (373)_{10}$

0000 0001 0111 0101 ; Original

$\boxed{1111\ 1110\ 1000\ 1010 \text{ ; 1's Complement}}$

7.) Determine the 2's complement of each binary number using either method

a.) $(11001101)_2 \rightarrow (205)_{10}$

11001101

00110010 ; 1's Complement

$\boxed{00110011 \text{ ; 2's Complement}}$

b.) $(11010111)_2 \rightarrow (215)_{10}$

11010111

0010 100 0 ; 1's Complement

$\boxed{0010\ 100\ 1 \text{ ; 2's Complement}}$

8.) −121

2	121
2	60 → 1
2	30 → 0
2	15 → 0
2	7 → 1
2	3 → 1
	1 → 1

0 1111001 ; original (121)

a.) 11111001 ; (−121)

b.) 10000110 ; 1's complement

c.) 10000111 ; 2's complement

9.) $(10011001)_2 \rightarrow (153)_{10}$

0000 0000 1001 1001 ; original (+153)

a.) 1000000 1001 1001 ; (−153)

b.) 01100110 ; 1's complement

c.) 01100111 ; 2's complement

10.) Convert each binary number to Gray Code:

a.) 11011

Gray Code = 10110

1+1+0+1+1
↓
10110

b.) 1001010

Gray Code : 1101111

1+0+0+1+0+1+0
↓
1101111

c.) 111101110111 0

Gray Code: 1000110011001

1+1+1+1+0+1+1+1+0+1+1+1+0
↓
1000110011001

11.) Convert each Gray Code to binary:-

a.) $(1010)_{GC} \rightarrow (1100)_2$

1010

1100

$\boxed{\text{Binary: } 1100}$

b.) $(00010)_{GC} \rightarrow (00011)_2$

$\boxed{\text{Binary:- } 00011}$

c.) $(11000010001)_{GC} \rightarrow (10000011110)_2$

11 00001000 1

10000011110

1

$\boxed{\text{Binary:- } 10000011110}$