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ASSIGMENT #01

ID: 38186

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PROBLEM: 01:-

Convert the following binary number in decimal.:

a) 11110010

$\Rightarrow 11110010$

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

$\Rightarrow (1\times128)+(1\times64)+(1\times32)+(1\times16)+(0\times8)+(0\times4)+(1\times2)+(0\times1)$

$\Rightarrow 128+64+32+16+0+0+2+0$

$\Rightarrow 242$ //.

b) 1110001.0001

$\Rightarrow (1\times2^6)+(1\times2^5)+(1\times2^4)+(0\times2^3)+(0\times2^2)+(0\times2^1)+(1\times2^0)+(0\times2^{-1})+(0\times2^{-2})+(0\times2^{-3})+(1\times2^{-4})$

$\Rightarrow 64+32+16+0+0+0+1+0+0+0+0.0625$

$\Rightarrow 113.0625$ //

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PROBLEM: 02:-

i) What is the highest number that can be represented by eight and eleven number of binary digit (bits)?

For 8 bits $2^8 - 1 = 255$

For 11 bits $2^{11} - 1 = 2047$ Ans.

ii) Convert -2110 and -284 decimal numbers to binary and using the 2's complement form.

First Convert 2110 and 284 in binary

2110 = 100001001110

284 = 100011100

Invert the bits

→ 100001001110

→ 011110110001

→ 100011100

→ 011100011

Add 1 in both

→ 011110110001

+1

⇒ 011110110010 Ans

→ 011100011

+1

⇒ 011100100 Ans

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PROBLEM: 08:-

i) Express 0111111000010101011 in sign-magnitude binary numbers in single precision floating point formate.

Sign bit	Exponent	Mantissa
0	11111000	01010110000000000000000

ii) Determin the value of
1 10000001 01001001110001000000000
single-precision floating point.

Sign	Exponent	Mantissa
=> 1	10000001	01001001110001000000000

↓

-1 129

Exp = (129-27) = 2

Formula for single-precision IEEE 754 floating-point number is:-

formula:- $\left[(-1)^{\text{sign bit}} \times 2^{(\text{exponent}-\text{bias})} \times 1.\text{fractions}\right]$

Mantissa

$\Rightarrow (01001001110001000000000)_2 = (1.30078125)_{10}$

Applying Formula:

$\text{Value} = (-1)^1 \times 2^{(2-127)} \times 1.30078125 = 0.016601\$625$

$= -0.016601\$625$

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PROBLEM : 04 :-

i) Convert decimal number 156 to 8421 BCD.

First convert each digit to its 4-bit BCD representation.

1 : 0001
5 : 0101
6 : 0110

Combine BCD representation
⇒ 000101010110 Ans.

ii) Convert BCD number 100001110000 to decimal.

~~1000~~
Separate 4-bits
1000 : 8
0111 : 7
0000 : 0

BCD 100001110000 = 870 in decimal Ans.

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iii) Add the BCD numbers:
01010001 + 01011000.

Separate 4 bits:
0101 : 5 ; 0101 : 5
0001 : 1 , 1000 : 8

Adding together

5+1+5+8 = 19 ∫

iv) Convert binary number 1111011101110 to gray code.

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

1111011101110 ∫.

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PROBLEM:05:-

i) A certain message is encoded using padded ASCII-code and stored in memory as "01001000 01000101 01001100 01001100 01001111". What is the message.

Binary	Number	ASCII VALUE
01001000	= 72 =	H
01000101	= 69 =	E
01001100	= 76	L
01001100	= 76	L
01001111	= 79	O

The Encoded message is "HELLO".

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ii) An odd-parity bit is also included at the end of each code group? (Hint: Remember that this is a BCD code).

a) 1000010110000

Odd parity bit.
Even

b) 0100011101100

Even Parity bit.

c) 011111000011

Odd parity bit.

d) 100001100101

Odd parity bit.

"The End"