**Question:**

Could you please help me to figure out the following question with details! Thanks so much!

Q1: What is the **ASCII representation** for the character string **+15.3682** in the following number systems:

(a) Hexadecimal

(b) binary

(c) octal

(d) decimal

Q2:

(a) Represent the **fixed point decimal number** + 78.875 in **IEEE 754 floating point format**. Express your final answer in **hexadecimal** showing all the working.

(b) Consider a **hypothetical floating point format** which is similar to IEEE 754 format except that it uses 6 bit excess-31 notation for the exponent, and 25 bits for the mantissa in a 32 bit machine. Represent the decimal number from part (a) in hexadecimal using this hypothetical format. Show all the working.

(c) The hexadecimal number C37DD000 represents a decimal number using IEE 754 floating point format.

What **decimal number** does this represent? Show all the working.

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**Subject:**

* Computer Science
* Due in 19 hours 40 minutes

### **1 Answer**

**NOTE:- PLEASE REFER TO THE FOLLOWING LINK FOR THE APPENDIX OF THE ASCII CHARACTERS.**

<https://www.ibm.com/support/knowledgecenter/en/ssw_aix_72/network/conversion_table.html>

**Q1 STRING => +15.3682**

**(a).** **Hexadecimal**

**2B 31 35 2E 33 36 38 32**

**(b).** **Binary**

**101011 110001 110101 101110 110011 110110 111000 110010**

**(c).**  **Octal**

**53 61 65 56 63 66 70 62**

**(d). Decimal**

**43 49 53 46 51 54 56 50**

**Explanation:**

**Mapping the value of ASCII characters into binary from the appendix.**

**+ = 101011**

**1 = 110001**

**5 = 110101**

**. = 101110**

**3 = 110011**

**6 = 110110**

**8 = 111000**

**2 = 110010**

Binary to Decimal

**+**

1010112 =(1×25)+(0×24)+(1×23)+(0×22)+(1×21)+(1×20)

1010112 =32+0+8+0+2+1

1010112 =4310

**1**

1100012 =(1×25)+(1×24)+(0×23)+(0×22)+(0×21)+(1×20)

1100012 =32+16+0+0+0+1

1100012 =4910

**5**

1101012 =(1×25)+(1×24)+(0×23)+(1×22)+(0×21)+(1×20)

1101012 =32+16+0+4+0+1

1101012 =5310

**.**

1011102=(1×25)+(0×24)+(1×23)+(1×22)+(1×21)+(0×20)*1*  
*101110*2=32+0+8+4+2+0  
*101110*2=4610

**3**

1100112=(1×25)+(1×24)+(0×23)+(0×22)+(1×21)+(1×20)  
*110011*2=32+16+0+0+2+1

*110011*2=5110

**6**

1101102= (1×25)+(1×24)+(0×23)+(0×22)+(1×21)+(1×20) *110110*2=32+16+0+4+2+0  
*110110*2=5410

***8***

1110002= (1×25)+(1×24)+(0×23)+(0×22)+(1×21)+(1×20) *111000*2=32+16+8+0+0+0

*111000*2=5610

*2*

1100102= (1×25)+(1×24)+(0×23)+(0×22)+(1×21)+(1×20)  
*110010*2=32+16+0+0+2+0

*110010*2=5010

Binary to Hexa-Decimal

Split the binary number from left to right each group 4 bits.

**+**

0010 1011

2 B

1010112 =2*B*16

**1**

0011 0001

3 1

1100012 =3116

**5**

0011 0101

3 5

1101012 =3516

**.**

0010 1110  
 2 E   
  
1011102=2E16

**3**

0011 0011  
 3 3   
  
1100112=3316

**6**

0011 0110  
 3 6

**8**

0011 1000  
 3 8   
  
1101102=3616

2

0011 0010  
 3 2   
  
1100102=3216

Binary to Octal

Split the binary number from left to right each group 3 bits

**+**

101 011

5 3

1010112 =538

**1**

110 001

6 1

1100012 = 618

**5**

110 101

6 5

1101012 =658

**.**

101 110  
 5 6   
  
1011102=568

**3**

110 011  
 6 3   
  
1100112=638

**6**

110 110  
 6 6   
  
1101102=668

8

111 000  
 7 0   
  
1110002=708

2

110 010  
 6 2   
  
1100102=628

1)

-85.62585=64+0+16+0+4+0+1 => in binary it is 10101010.625=0.5+0.125 => in binary it is 0.10185.625 in binary it is 1010101.101 => 1.010101101\*2^6sign bit is 1(-ve)exp bits are (127+6=133) => 10000101frac bits are 01010110100000000000000-85.625 in IEEE754 format is 1 10000101 010101101000000000000001 10000101 01010110100000000000000 => 1100 0010 1010 1011 0100 0000 0000 0000 => C2AB4000 in Hex-85.625 in IEEE754 hex format is C2AB4000  
-85.62585.625 in binary is 1010101.101 => 1.010101101 \* 2^6sign bit is 1(-ve)exp bits are (31+6 = 37) => in binary 37 is 100101mantissa bits are 0101011010000000000000000-85.625 IEEE excess-31 format is 1 100101 0101011010000000000000000

