Q.1 Consider the following 1EEE single precision floating point number shown below.

0100001111101 0000 0000 0000 0000 0000

The decimal equivalued of above number is ___416 Ans___   [NAT]

S(1bit) E(8bit)   M(23bit)

0	10000111	101 0000 0000 0000 0000 0000

$$Sign = 0 \ [+ve]$$

$$E = 1000\ 0111$$

$$\boxed{E = 135}$$

Ans (416)

$$M = 10100000000000\ldots$$

$$E = e + bias \quad \text{or} \quad BE = AE + bias$$

$$\leftarrow 32bit \rightarrow$$

S	E	M
1bit	8bit	23bit

$$bias = 2^{8-1} - 1$$

$$e = E - bias$$

$$\boxed{E = 135}$$
$$bias = 127$$

$$\boxed{bias = 127}$$

$$(-1)^S \, 1.M \times 2^e \Rightarrow (-1)^S \, 1.M \times 2^{E-bias}$$

$$\overset{\frac{1}{256}}{}$$

$$(-1)^0 \, 1.101000000000000\ldots \times 2^{135-127}$$

$$+ \, 1.101000000000000 \times 2^{+8}$$

$$\begin{array}{r} \frac{1}{256} \\ + \frac{160}{416} \end{array}$$

$$\overset{256\,128\,.\,32}{110100000.00000} \underline{}$$

$$= \boxed{416 \ Ans}$$
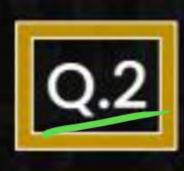
Q.2 Consider the hexadecimal representation in IEEE754 single precision floating number system: 0X43758000. What is the decimal value represented by it?

[MCQ]

A. 245.5

B. 244.5

C. 240.5

D. None of the above

S	E	M
1bit	8bit	23bit

Ans(A)

0x 4 3 7 5 8 0 0 0

1bit   E(8bit)   m(23bit

| 0|100 0011 0|111 0101   1000 0000 0000 0000 |

Sign = 0 (+ve)

Implicit

$(-1)^S \ 1 \cdot M \times 2^e$

E = 100 00110

$(-1)^0 \ 1 \cdot 111\ 0101\ 1000 \times 2^{+7}$

E = 134

$+\ 1\ 1111\ 0101 \cdot 1000$
$\underbrace{\qquad}_{240} \qquad 2^1$

M: 111 0101 1000 0000...

245·5

bias = 127

245·5   Ans

BE = AE + bias or E = e + bias

e = E − bias   e = 7

= 134 − 127
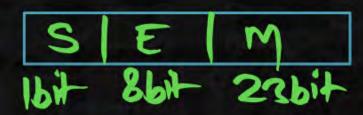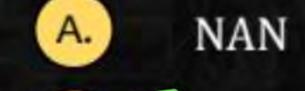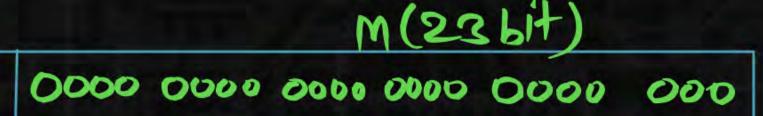
In IEEE 754 single precision floating point standard the number 1111 11111 0000 0000 0000 0000 0000 000 represents.

[MCQ]

S	E	M
1bit	8bit	23bit

A. NAN

B. $-\infty$

C. A negative normalized number

D. None of the above

S(1bit)	E(8bit)	M(23bit)
1	1111 1111	0000 0000 0000 0000 0000 000

$S = 1 \ [-ve]$

$E = 1111 \ 1111$

$\left. \begin{array}{l} E = 255 \\ \& \ M = 0 \end{array} \right\} \Rightarrow$ Infinity

$-$Infinity

Sign $= 1$ $(-ve)$

Ans (B)

Consider the following hexadecimal value in the IEEE 754 single precision floating point number: 0XC4127000, then what is the value represented by it in decimal?
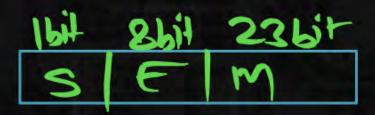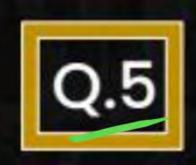
[MCQ]

A. (-585.75)

B. (-586.75)

C. (-580.75)

D. None of these

1bit 8bit 23bit

| S | E | M |

Ans (A)

C412 7000

1bit   E(8bit)   M(23bit)

| 1 | 100 0100 0 | 001 0010 0111 0000 0000 0000 |

m: 0010 0010 0111 0000 0000 0000

Sign = 1 [-ve]

E = 10001000

E = 136

bias = 127

E = e + bias

e = 136 - 127

e = +9

$(-1)^s \ 1.m \times 2^e$ Implicit Normalization.

$(-1)^1 \ 1.001 \ 001 \ 00111 \ 00000000... \times 2^{+9}$

512
64
9

585

1001 001 001.1100 × 2⁰

(585.75) Avg
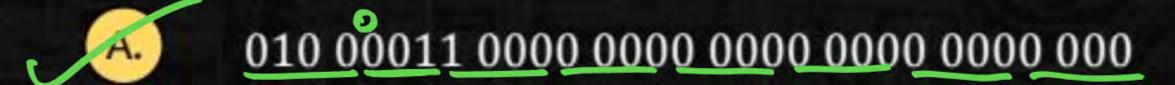
Q.5 What is IEEE 754 32 bits floating point format representation of 16?

[MCQ]

0100 0001 1000

(A.) ✓ 010 00011 0000 0000 0000 0000 0000 000

(B.) ✗ 011 000011 0000 0000 0000 0000 0000 000

(C.) ✗ 0100000111 0000 0000 0000 0000 0000 000   Ans (A)

(D.) None of the above

$$+(16)$$

$$10000 \times 2^{0}$$

Implicit $\Rightarrow +1.0000 \times 2^{+4}$

| 0 | 1000 0011 | 0000 0000 0000 0000 0000 000 |

Sign $= +ve$ (0)

$e = 4$

0100 0001 1000 0000 . _ _ _ _ .

bias $= 127$
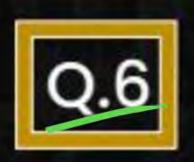
Mantissa : 00000000 . . .

Ⓞ𝐏
BE = AE + bias
E = e + bias

E : 10000011

$$\dfrac{4 + 127}{}$$

$$\boxed{E = 131}$$

Q.6

Consider the following binary value in 1EEE 754 single precision floating point number representation.

0 10000111 1111010 0000 0000 0000 0000 what decimal value is it representing?

[MCQ]

E(8bit)   M(23 bit)

| 0 | 1000 0111 | 1111 0100 0000 0000 0000 000 |

A. 300

B. 400

C. 500

D. None of these

$E = 1000\ 0111$

$\boxed{E = 135}$

$bias = 127$

$E = e + bias$

$e = 135 - 127$

$Sign = \underline{0(+ve)}$ $\boxed{e = +8}$

$(-1)^s\ 1 \cdot m \times 2^e$

$(-1)^0\ 1 \cdot 1111\ 0100\ 00000000\ldots \times 2^{+8}$

$\overset{256}{\llcorner}\ 1\underset{244}{\underline{\ 1111}} \cdot 0100 \cdot 0000 \times 2^0$

$(500)\ \underline{Ans}$

$\boxed{Ans\ [C]}$

$\begin{array}{r} 256 \\ +244 \\ \hline 500 \end{array}$