ONLINE LESSION

-CS-UNIT-2-

Fractional Numbers Representation

1. Fractional Converting.

a. Decimal fractions to Binary Conversions.

21.25, relevant binary number?

b. Binary fraction.

2	1	0	.	-1	-2	-3	-4
2^2	2^1	2^0		2^{-1}	2^{-2}	2^{-3}	2^{-4}
4	2	1		$1/2^1$	$1/2^2$	$1/2^3$	$1/2^4$
				½	¼	1/8	1/16
				0.5	0.25	0.125	0.0625
				↓	↓	↓	↓
				1	2	3	4

$0.1_2 = 0.5_{10}$
$0.01_2 = 0.25_{10}$
$0.11_2 = 0.75_{10}$
$0.001_2 = 0.125_{10}$
$0.101_2 = 0.625_{10}$
$0.111_2 = 0.875_{10}$

Ex: 101.11_2

1 0 1 . 1 1

4 2 1 0.5 0.25

4 + 0 + 1 0.5 + 0.25

5 0.75

5.75_{10}

IMPORTANT.

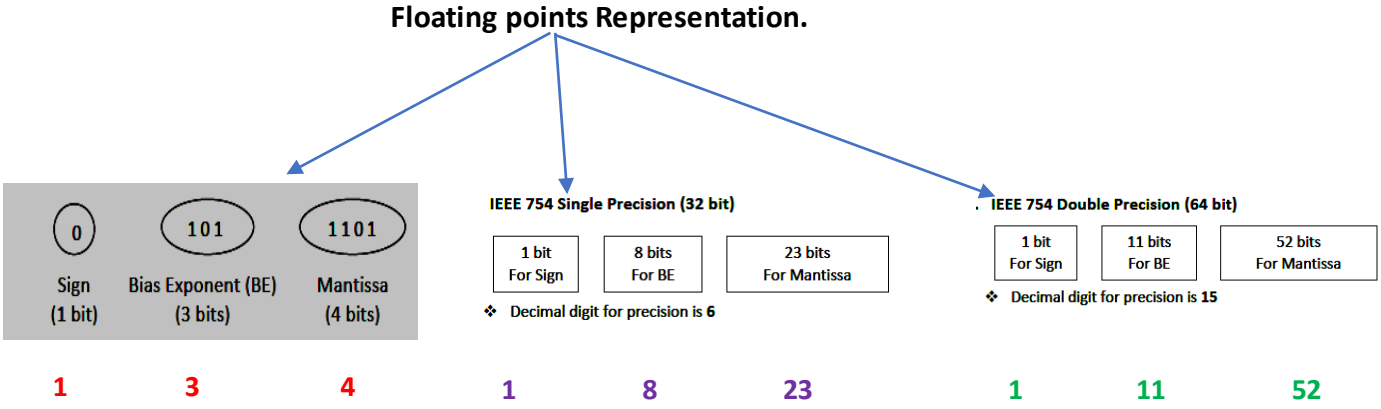
Method 7 , 8

2018-07

7) Convert the decimal number 0.171875 to binary

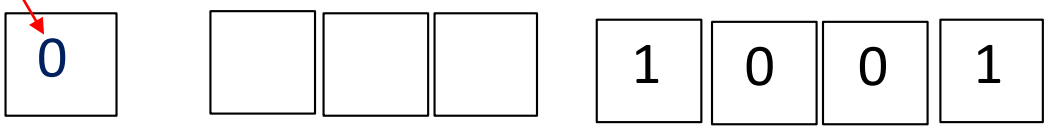
(a) 0.010111	(b) 0.001101	(c) 0.001011
(d) 0.001110	(e) 0.000111	

Floating points Representation.



Samples → 3.125 using Simple model (8 bit).

Step 0 → Write the given format.



1 (Sign bit) **3 (BE)** **4(Mantissa)**

Step 0 → Apply sign bit value {Positive number → 0, Negative number → 1}

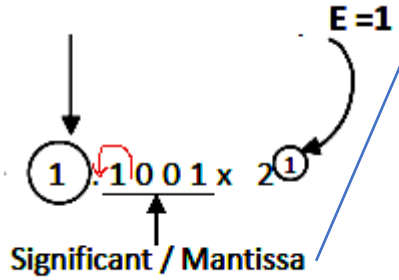
Step 1 → Get Binary.

3.125

↓

11.001

Step 2 → convert binary pattern in to scientific notation and get mantissa.



Step 3 → Find the BE using followed equations,

$$BE = E + k$$

Real Exponent

Constant based on number of digits of bias exponent

$$k = 2^{n-1}-1$$

$$k = 2^{n-1} - 1$$
$$= 2^{3-1} - 1$$
$$= 3$$

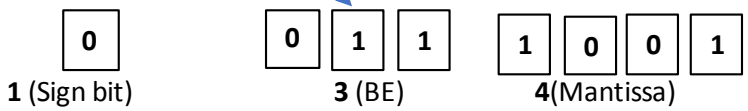
BE = 1 + 3

=4

Step 4 → convert BE decimal number into binary and complete the pattern.

4→ 0 1 1

Step 5 → Complete pattern.



1 (Sign bit) **3** (BE) **4**(Mantissa)

FORWORD QUESTIONS.

2014-11

11) The IEEE standard 32-bit floating point representation of the binary number **32.5** is

(a) 0 01111111 11000000000000000000000
(b) 1 10000011 00001100000000000000000
(c) 0 10000100 00000100000000000000000
(d) 0 10000011 00000100000000000000000
(e) 0 11000001 11100000000000000000000

2015-11

11) The IEEE standard 32-bit floating point representation of the binary number +42.625 is

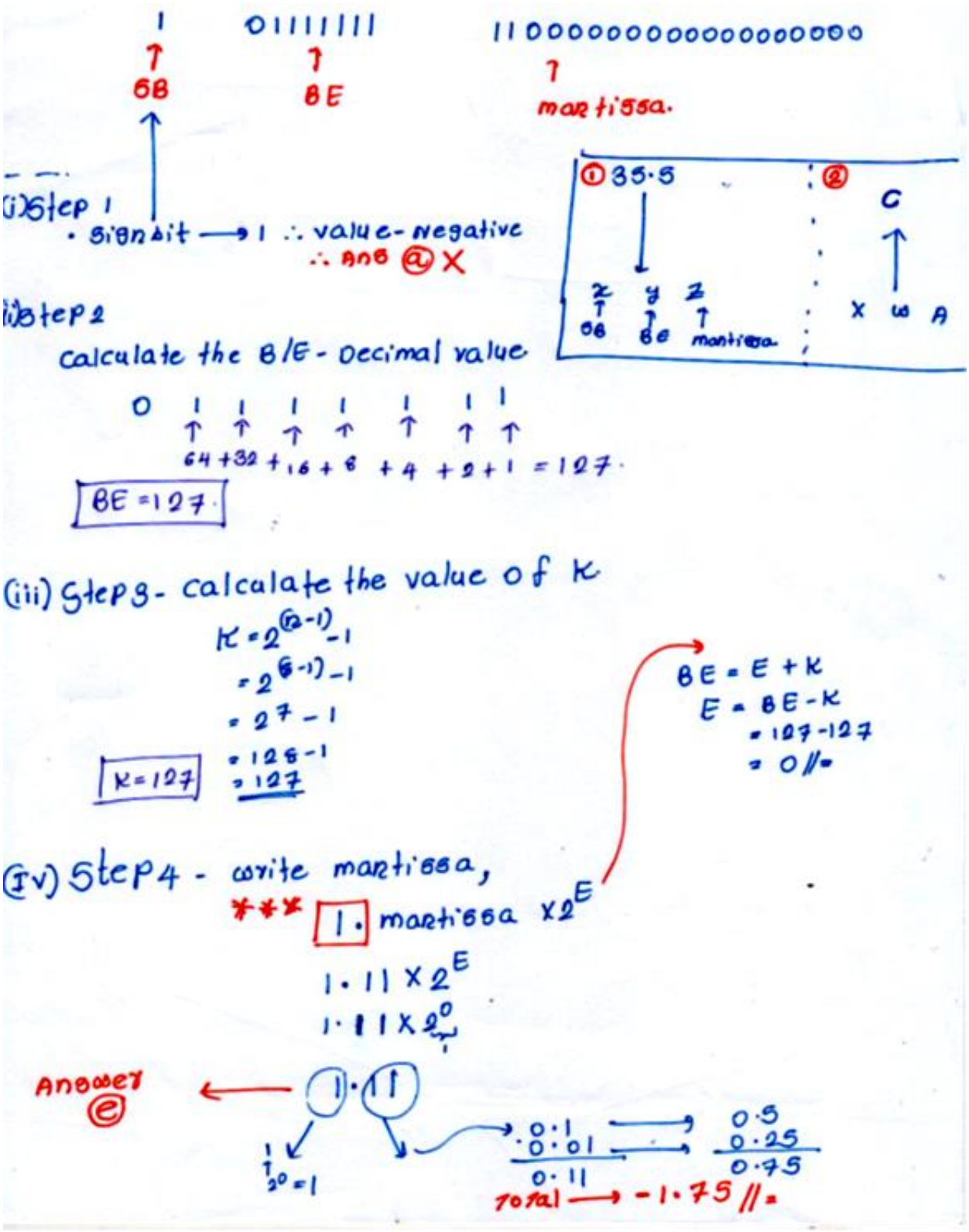
(a) 0 01111111 11000000000000000000000
(b) 1 10000011 01010101000000000000000
(c) 0 10000100010101010000000000000000
(d)0 10000011 10101010000000000000000
(e) 0 10000010010111100000000000000000

BACKWORD QUESTIONS.

2012-8

8) The equivalent in decimal number to the IEEE standard 32-bit floating point representation of **1 01111111 11000000000000000000** is

(a) +1.1	(b) -1.0	(c) +1.11
(d) -0.1	(e) -1.11	



2017-10

10) Which of the following is the correct decimal number of the 16-bit floating point representation 010101 0101011010 with a sign bit, 5-bit exponent and 10-bit mantissa?

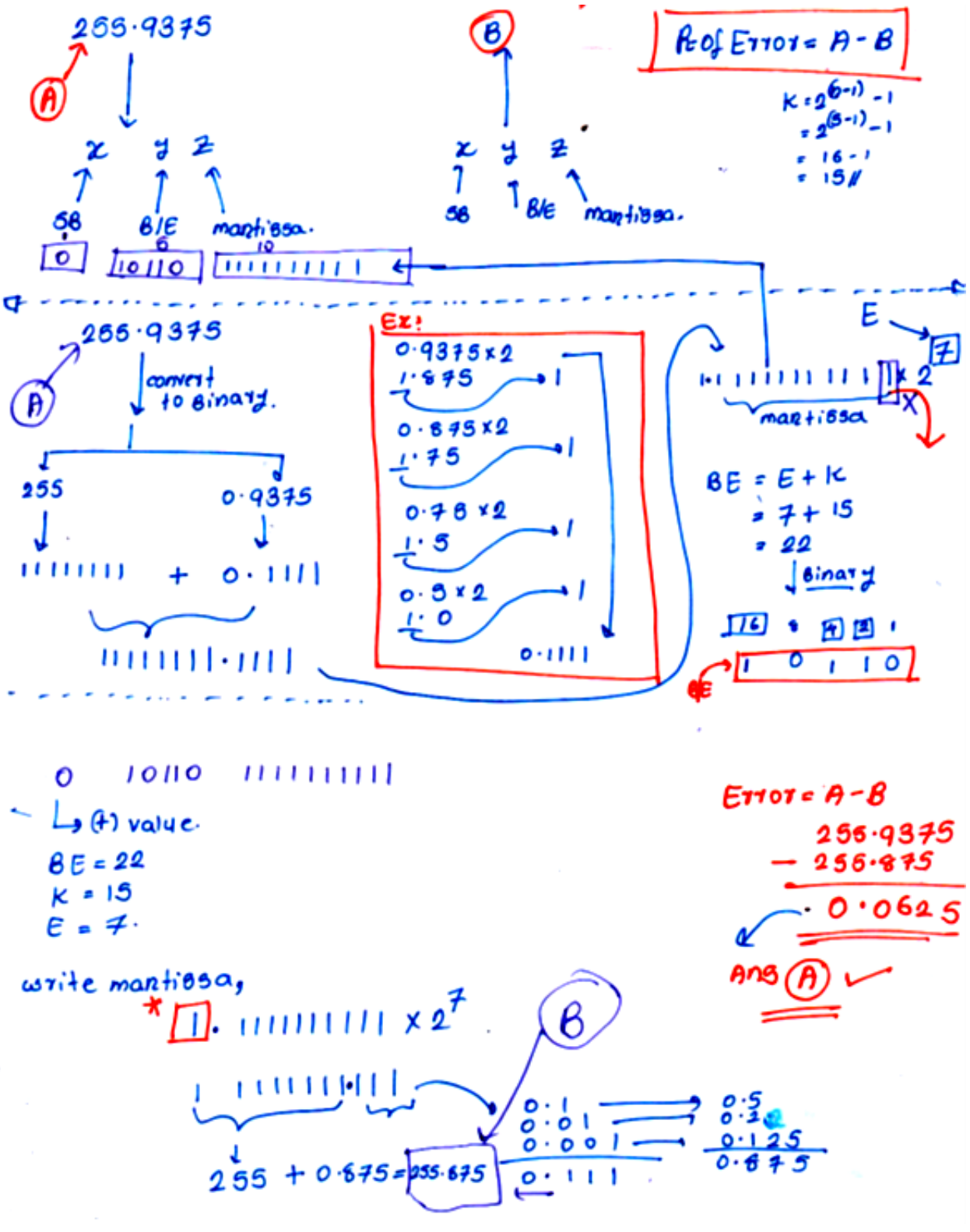
(a) +87.625	(b) +85.625	(c) +89.625
(d) +43.625	(e) +47.625	

Floating points -Round-Off-Error

2014-09

9) What is the loss of accuracy (round-off-error) when converting the decimal value +255.9375 to 16-bit floating point representation with a sign bit, 5-bit exponent and a 10-bit mantissa?

(a) 0.0625	(b) 0.125	(c) 0.1875
(d) 0.25	(e) 0.5	

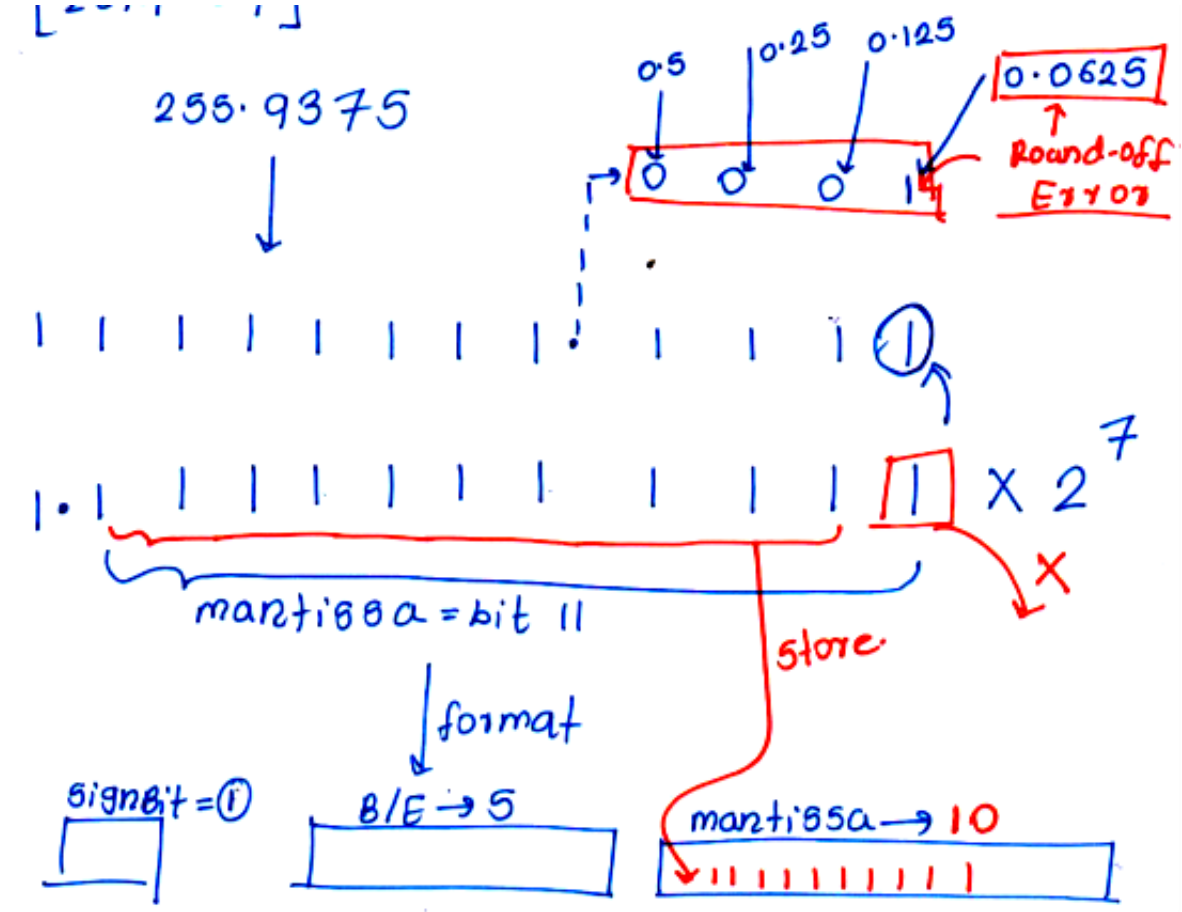


Round-Off-Error -Short Method

2014-09

9) **What is the loss of accuracy (round-off-error) when converting the decimal value +255.9375 to 16-bit floating point representation with a sign bit, 5-bit exponent and a 10-bit mantissa?**

(a) 0.0625	(b) 0.125	(c) 0.1875
(d) 0.25	(e) 0.5	



2015-09

9) What is the loss of accuracy (round-off-error) when converting the decimal value +511.875 to 16-bit floating point representation with a sign bit, 5-bit exponent and a 10-bit mantissa?

(a) 0.0625	(b) 0.125	(c) 0.1875
(d) 0.25	(e) 0.5	

2016-10

10) What is the loss of accuracy (round-off-error) when converting the decimal value +1000.875 to 16-bit floating point representation with a sign bit, 5-bit exponent and a 10-bit mantissa?

(a) 0.125	(b) 0.25	(c) 0.375
(d) 0.625	(e) 0.75	