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Course : CSE340

Section : 12

Assignment no: 02

Ans: to the que no: 01

```
mult  $s0 , $s1
mflo  $s2
add   $s3, $t0, $s2
```

Ans: to the que no: 02

```
div   $s0, $s1
mflo  $s2.
add   $s3, $t1, $s2
```

Ans: to the que no: 3

Given, $x = (A[4] + B[2] + (B[3] - 5x))$

A → \$S0
B → \$S1
x → \$S2

```
lwc1   $f0, 16($s0)
lw     $t0, 8($s1)
~~mtc1~~
mt.c1 , $t0, $f1
cvt.s.w  $f1, $f1
add.s  $f0, $f0, $f1
lw     $t0, 12($s1)
sll    $t1, $s2, 2
add    $t1, $s2, $t1
sub    $t0, $t0, $t1
mtc1   $t0, $f2
cvt.s.w  $f2, $f2
add.s  $f0, $f0, $f2
```

cvt.w.s \$f0, \$f0

mfc1 \$s2, \$f0

<u>a</u>

Ans: to the que no: 04

Single Precision - 32 bit

Sign bit	Exponent	fraction
1 bit	8 bit	23 bit

Biased Exponent = 8 bits

$\therefore$ Bias $= 2^{(8-1)} - 1$

$= 127$

Given value $= -72 \cdot 3456$

$(72)_{10} = (100\ 1000)_2$

$(0 \cdot 3456)_{10} = (010110000\ 1111001\ 0011110)_2$

$\therefore (72 \cdot \cancel{0}3456)_{10} = (1001000 \cdot 01011000011110010011110 \times 2^0)_2$

Normalized binary.

$= 1.00100001011000011110010011110 \times 2^{6}$

$\therefore$ Exponent $= 6$

$\therefore$ Biased Exponent $= 6 + 127$

$= 133.$

Ans

b

For 18 bit register

Biased Exponent $= 6$ bits

$\therefore$ Bias $= 2^{6-1} - 1$

$= 31$

From 'a' we get

Exponent $= 6$

$\therefore$ Biased exponent $= 31 + 6$

$= 37$

Ans

c

For 21 bit register,

Biased Exponent bit = 7

$\therefore$ Bias $= 2^{7-1} - 1$

$= 63$

From, 'a';

Exponent $= 6$

$\therefore$ Biased Exponent $= 63 + 6$

$= 69$

Ans

Ans: to the que no: 5

Given that,

Multiplicand $(1000)_2 \rightarrow (8)_{10}$

Multiplier $(101)_2 \rightarrow (5)_{10}$

Iteration	Multiplicand	Multiplier	Product
1	0000 1000	0101	00001000
	00010000	0101	00001000
	00010000	0010	0000 1000
2	00100000	0010	00001000
	00100 000	000 1	0000 1000
3	00100000	0001	00101000
	01000000	0001	00101000
	01000000	0000	0010 100 0
4	10000000	0000	0010 100 0
	10000000	0000	00101000

So, we get $(00101000)_2 = (40)_{10}$

Ans

Ans: to the que. no: 6

Given,

Multiplicand $(0110)_2 \rightarrow (6)_{10}$

Multiplier $(110)_2 \rightarrow (6)_{10}$

Iteration	Multiplicand	Multiplier	Product
1	0110		00000011
2	0110		0110 0011
	0110		0011 0001
3	0110		1001 0001
	0110		0100 1000
4	0110		0010 0100

so, we get $(00100100)_2 = (36)_{10}$

Ans: to the que no: 7

$$X = (7AC\,D0000)_{16}$$

$$= (01{\cdot}11101011001\ 1010000000000$$
$$000000)_2$$

$$= 0 \quad 11110101 \quad 10011010000000000000000$$

sign Exponent Fraction

$\therefore$ Biased Exponent $= (11110101)_2$

$= (245)_{10}$

For single Precision,

Bias $= 127$

Exponent $= 245 - 127$

$= 118$

Fraction $= (0{\cdot}1001101000\ 0000000000000)_2$

∴ ~~M~~Normalized binary,

$X = 1 \cdot 1001101000000000000000 \times 2^{118}$

Now

$Y = (5BCA0000)_{16}$

$= (\underbrace{0}_{\text{sign}} \; \underbrace{10110111}_{\text{Exponent}} \; \underbrace{10010100000000000000000}_{\text{fraction}})_2$

∴ Biased Exponent $= (10110111)_2$

$= (183)_{10}$

∴ Exponent $= 183 - 127$ (single Precision)

$= 56$

∴ Normalized binary

$Y = 1 \cdot 10010100000000000000000 \times 2^{56}$

$= 0 \cdot [6103 \cdots] 11001010000000000000000 \times 2^{118}$

$\therefore X + Y = 1 \cdot 1001101 [54 \cdots] 1100101000000000000000$
000×2^{118}

Ans: to the que no; 08

$X = (19.454)_{10} = (10011.0111010)_2$

Normalized Binary,

$X = (1.00110111010) \times 2^4$

$Y = (3.0124)_{10}$

$= (11.0000001100)_2$

Normalized Binary,

$Y = (1.10000001100) \times 2^1$

$X * Y = 1.11010100101100 1 \times 2^5$

$= (58.6032)_{10}$

Ans

Ans: to the que no: 09

$X = (-9.435)_{10}$

$= (-1001.0110111101)_2$

$= -1.0010110111101 \times 2^3$ (Normalized)

$Y = (15.129)_{10}$

$= (1111.0010000100)_2$

$= 1.1110010000100 \times 2^3$

$X * Y = -10.0011101011111 \times 2^6$

$= (-142.734375)_{10}$

Ans: to the que no: 10

Given

63.7813

$\therefore (63.7813)_{10} = (111111.1100100\ldots)_2$

$= (1.1111111001000\ldots) \times 2^5$

a

Here, Biased Exponent = 6 bits

$\therefore$ Bias $= 2^{6-1} - 1$

$= 31$

$\therefore$ Bias Exponent $= 31 + 5$

$= 36$

$\therefore$ IEEE floating point representation :

0	100100	1111111100100
Sign	Exponent	Fraction

$\therefore$ The hexadecimal number : $(93F90)_{16}$

A

b

Biased Exponent = 4 bit

$\therefore$ Bias $= 2^{4-1} - 1$

$= 7$

$\therefore$ Bias Exponent $= 7+5$

$= 12$

Now, $(12)_{10} = (1100)_2$

IEFE Representation

0	1100	11111111001
Sign	Exponent	fraction

$\therefore$ Hexadecimal number: $(67F)_{16}$