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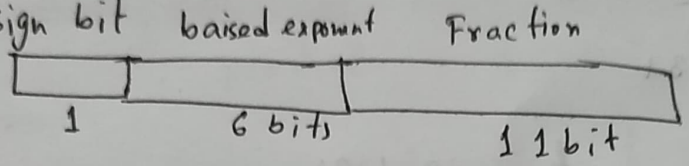
Section: 9

Question -1 :-

given, biased exponent is 6 bits and 18 bit IEEE-754 Floating Point Representation.

So,



110.101×10^{-2}

$\Rightarrow$ 1.10101

Step: 1

now, 1 in Binary → 0001

0.90101 in Binary →

0.10101 × 2 = 0.20202 = 0

0.20202 × 2 = 0.40404 = 0

0.40404 × 2 = 0.80808 = 0

0.80808 × 2 = 1.61616 = 1

0.61616 × 2 = 1.23232 = 1

0.23232 × 2 = 0.46464 = 0

0.46464 × 2 = 0.92928 = 0

0.92928 × 2 = 1.85856 = 1

0.85856 × 2 = 1.71712 = 1

0.71712 × 2 = 1.43424 = 1

Step-2 :-

∴ 1.10101 in Binary = 0001.00011 00111

(normalized value) = $1.00011\ 00111 \times 2^{0}$

now, Step-3:-

~~exp~~
~~Sign bit =~~

b) exponent = 0

$$\text{bias} = 2^{(6-1)} - 1$$

$$= 2^{5} - 1$$

$$= 31$$

$\therefore$ baised exponent = 0 + 31

= 31

in Binary = 0 1 1 1 1 1

Step-4:-

now signed bit = 0

Fraction = 000 1 1 00 1 1 1 0 in 11 bits

Final step:-

$\therefore$ IEEE-754 18 bit Floating point Representation.

= ~~0 011111 000 11 00 1110~~

= (0 011111 000 1 1 00 1 1 1 0)$_2$ in Binary

Ans.

Question - 2 :-

as hardware is 4 bit Architecture,

So, multiplicand ⇒ 2 = 0010 in Binary (4 bit)

multiplier ⇒ 4 = 0100 in Binary (4 bit)

∴ product = 0000 0100 in Binary (8 bit)

now,

Iteration	multiplicand 0010	Product 0000 0100
1	0010	Right shift 1 bit 00000 010
2	0010	Right shift 1 bit 00000 001
3	0010	0000 + 0010 = 0010 new product → 0010 0001 Right shift 1 bit ⇒ 00010 000
4	0010	Right shift 1 bit 00010 00

∴ product = 00001000 (in Binary)

= 8 (in Decimal)

Ans.

Question - 3 :-

C → $s1

A → $s2

j → $f2

C[3] = A[5] - 9 + (float) j

MIPS code :-

```
lw   $t0 $t0 , -20($s2)
addi $t0, $t0, -9
mtc1 $t0, $f3
cvt.s.w $f3, $f3
add.s $f4, $f3, $f2
swc1 $f4, 12($s1)
```

Ans.