

Princekumar Piyora

656570553

Tasko.pdf

E.A.I. 4.

1 0 0 1 0 1 1 0 0 0

↳ binary to decimal

↓
base 2

↓
base 10

1 0 0 1 0 1 1 0 0 0

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

2^9 2^8 2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0

$$= 2^9 \times 1 + 2^8 \times 0 + 2^7 \times 0 + 2^6 \times 1 + 2^5 \times 0 + 2^4 \times 1 + 2^3 \times 1 + 2^2 \times 0 + 2^1 \times 0 + 2^0 \times 0$$

$$= 2^9 + 0 + 0 + 2^6 + 0 + 2^4 + 2^3 + 0 + 0 + 0$$

$$= 2^9 + 2^6 + 2^4 + 2^3$$

$$= 512 + 64 + 16 + 8$$

$$= 600$$

$(1001011000)_2$ binary	→	$(600)_{10}$ decimal
----------------------------	---	-------------------------

E.A.2. c1.

2335

↓

Octal to decimal

↓

base 8

base 10

2 3 3 5
↓ ↓ ↓ ↓
 8^3 8^2 8^1 8^0

$$= 2 \times 8^3 + 3 \times 8^2 + 3 \times 8^1 + 5 \times 8^0$$

$$= 2 \times 512 + 3 \times 64 + 3 \times 8 + 5 \times 1$$

$$= 1024 + 192 + 24 + 5$$

$$= 1245$$

$(2335)_8 \rightarrow (1245)_{10}$
Octal decimal

0 1 2 3 4 5 6 7 8 9 A B C D E F

↓ ↓ ↓ ↓ ↓ ↓
10 11 12 13 14 15

E.A.3 d.

fffe.428

↓
hexadecimal to decimal

↓
Base 16 Base 10

f = 15

e = 14

f f f e . 4 2 8
↓ ↓ ↓ ↓ ↓ ↓
 $16^3 \ 16^2 \ 16^1 \ 16^0 \ 16^{-1} \ 16^{-2} \ 16^{-3}$

because it is the right side of the precision

$$= 15 \times 16^3 + 15 \times 16^2 + 15 \times 16^1 + 14 \times 16^0 + \frac{4}{16} + \frac{2}{16^2} + \frac{8}{16^3}$$

$$= 61440 + 3840 + 240 + 14 + 0.25 + 0.0078125 + 0.001953125$$

$$= 65534.25977$$

$$= 65534.260$$

$$(fffe.428)_{16} \longrightarrow (65534.260)_{10}$$

hexadecimal

decimal

E.A. 7 a.

38

↓

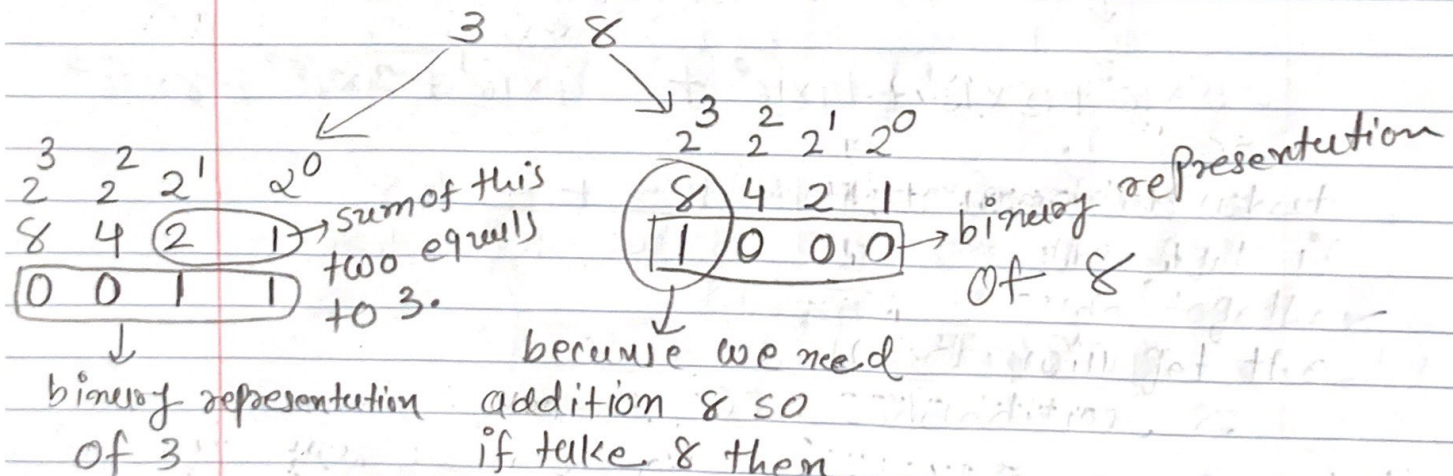
hexadecimal to binary

↓

base 16

↓

base 2



because we need addition 8 so if take 8 then we get the sum. and we will put 0 in other places because we are not using those digits.

$$\boxed{(38)_{16} \rightarrow (0011\ 1000)_2}$$

hexadecimal binary

EA. 10.

① 8 bit 2's Complement

$$0100\ 1011 - 0001\ 0111$$

1's Complement of the given 8 bit
→ just basically flipping the digits

$$1110\ 1000$$

+ 1 } and then we are adding one to get 2's complement

$$\boxed{1110\ 1001}$$

now we have to add this to given 8 bit

so, we will not consider this one

$$\begin{array}{r} 0100\ 1011 \\ + 1110\ 1001 \\ \hline 0011\ 0100 \end{array}$$

so, $\boxed{0011\ 0100}$ → is 2's complement for given 8 bit binary digits.

②

$$0100\ 0001 - 0001\ 0001$$

flipping the digits

$$1110\ 1110$$

→ 1's complement for given 8 bit

$$+ 1$$

(adding one)

$$1110\ 1111$$

→ 2's complement for given 8 bit

add this together

Will not consider this carry (1)

$$\begin{array}{r} 0100\ 0001 \\ + 1110\ 1111 \\ \hline \end{array}$$

$$0011\ 0000$$

so, $0011\ 0000$ → is 2's complement for given 8 bit number

③

$$1000\ 0001 - 0010\ 0000$$

flipping the digits

$$1101\ 1111$$

→ 1's complement

$$+ 1$$

(∴ adding 1)

$$1110\ 0000$$

add this two together

Will not consider this (1)

$$\begin{array}{r} 1000\ 0001 \\ + 1110\ 0000 \\ \hline \end{array}$$

so, $0110\ 0001$ → is 2's complement for given 8 bit number

Q.1 converting into IEEE 754 single precision floating point representation

(a) 2.5 (base 10)

dividing
2 by 2:

2	2	
2	1	0
	0	1

2 in binary: 10

multiplying
fractional
part by 2:

0.5 x 2	1.0	1
0.0 x 2	0.0	0

0.5 in binary: 1

$$(2.5)_{10} \rightarrow (10.1)_2 = 1.01 \times 2^1$$

→ $S(\text{sign}) = 0$ because positive number

→ Exponent (biased 127) = $127 + 1 = 128$ ($\because 1$ from 2^1)

2	128	
2	64	0
2	32	0
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

= (8 bits) 1000 0000

→ Fractional Part = 01

= (23 bits) 0100 0000 0000 0000 0000 0000

0	1000 0000	010 0000 0000 0000 0000 0000
---	-----------	------------------------------

↑
Sign

↓
Exponent

↓
fractional part

⑥ -0.001 (base 10)

→ we are just starting with positive version
 $|-0.001| = 0.001$

2 $\overline{10}$ 0 ↑ 0 in binary : 0

0.001×2	0.002	0	→ I think, I didn't get any fractional part that was equal to 0.
0.002×2	0.004	0	
0.004×2	0.008	0	
0.008×2	0.016	0	
0.016×2	0.032	0	
0.032×2	0.064	0	
0.064×2	0.128	0	
0.128×2	0.256	0	
0.256×2	0.512	0	
0.512×2	1.024	1	
0.024×2	0.048	0	

$$= (0.001)_{10} = 0.00000000010$$

$$= -(0.001)_{10} = -0.00000000010$$

→ To maintain the same degree of precision
 $2^k * 10^{-m} \geq 1$ $-m = \text{fractional part}$

$$2^k * 10^{-3} \geq 1$$

$$2^k \geq 1$$

$$k \geq 10$$

$$[-(0.001)_{10} = -1.0 \times 2^{-10}]$$

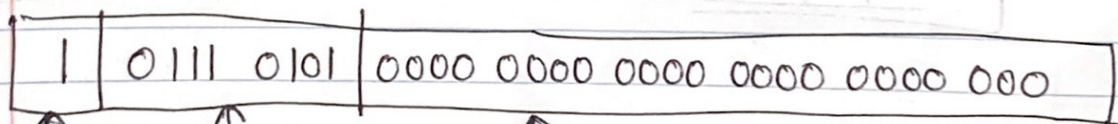
→ s (sign) = 1 because it is negative

→ Exponent (biased, 127) = $127 - 10$ (∵ -10 from 2^{-10})
= 117

$2 \overline{) 117}$		
$2 \overline{) 58}$	1	↑ = (8 bits) 0111 0101
$2 \overline{) 29}$	0	
$2 \overline{) 14}$	1	
$2 \overline{) 7}$	0	
$2 \overline{) 3}$	1	
$2 \overline{) 1}$	1	
0	1	

→ fractional part: $1.\underline{0}1$

= (23 bits) 0000 0000 1000 0000 0000 000



↑
sign

↑
exponent

↑
fractional part