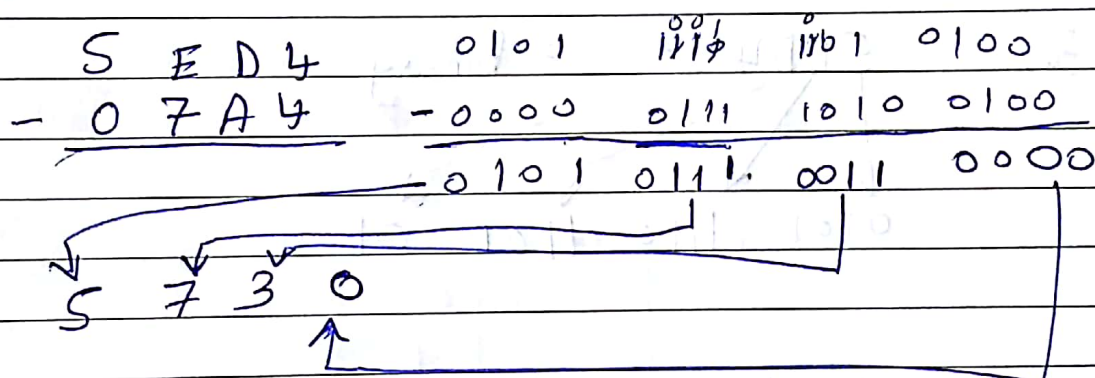
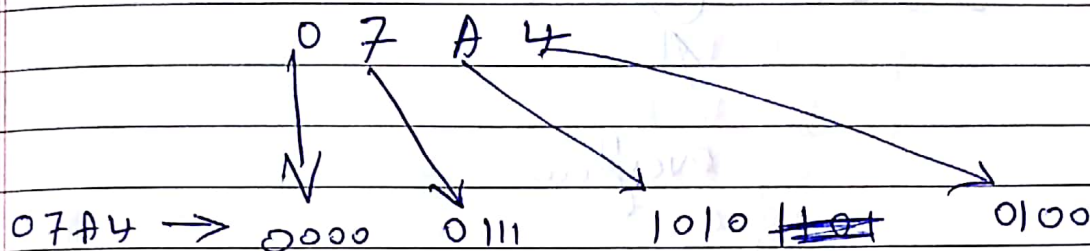
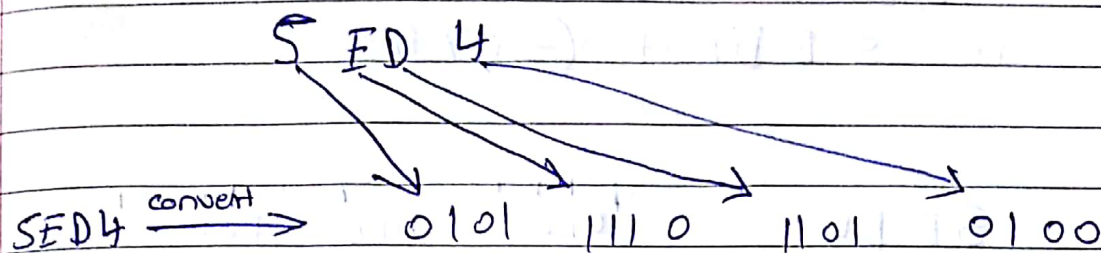


Assignment 3

classmate

Date _____
Page _____

3.1



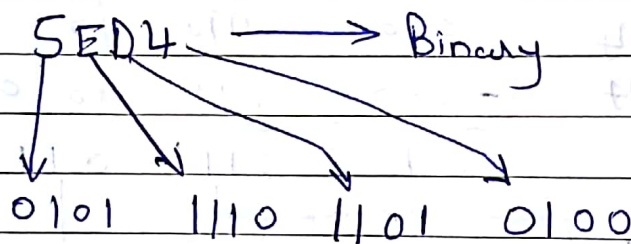
3.2

SED4 - 07A4
i.e. SED4 + (-07A4)

SED4	0101	1110	1101	0100
-07A4	+1111	1000	0101	1100
<u>5730</u>	<u>1</u> 0101	0111	0011	0000

↑
overflow

3.3



Hexadecimal system is very important because the primary representation of memory address in computers as modern computers operate at a base of 16, for eg 64 bit so 16×4 .

This makes representation accurate & easy. Big numbers can be represented in FFFFFF which is equivalent to 1048576. So hex saves letters.

3.8

185 \rightarrow 10111001 $\xrightarrow{\text{negate}}$ 01000110

2	185		↑ LSB
	92	1	
	46	0	
	23	0	
	11	1	
	5	1	
	2	1	
	1	0	
	0	1	msb

122 \rightarrow ~~1111~~ 0111010

2	122		↑
	61	0	
	30	1	
	15	10	
	7	1	
	3	1	
	1	1	
	0	1	msb

We add 1

$$\begin{array}{r}
 01000110 \\
 + 01111010 \\
 \hline
 11000000
 \end{array}$$

Since signed 8-bit integers range is
-128 to 127

3.9)

2^1 complement

$$151 \rightarrow 1001011 \xrightarrow{2^1 \text{ complement}} \underline{01101000}$$

2	151	
	75	1
	37	1
	18	1
	9	0
	4	1
	2	0
	1	0
	0	1

$$214 \rightarrow 11010110 \rightarrow \underline{00101001}$$

2	214	
	107	0
	53	1
	26	1
	13	0
	6	1
	3	0
	1	1
	0	1

~~151~~

Adding

$$(151)_{2's} \rightarrow 01101001$$

$$(214)_{2's} \rightarrow 00101010$$

Now adding

$$\begin{array}{r}
 01101001 \\
 + 00101010 \\
 \hline
 10010011 \\
 \hline
 \end{array}$$

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

$$= 2^7 + 2^4 + 2 + 1$$

$$= \underline{147}$$

3.10]

$$\begin{array}{rcll}
 & & 2's \text{ comp} & \text{Adding } 1's \\
 151 & \rightarrow & 10010111 & \rightarrow 01101000 \rightarrow 01101001 \\
 214 & \rightarrow & 11010110 & \rightarrow 00101001 \rightarrow \underline{00101010} \\
 & & & 00111110
 \end{array}$$

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

$$= 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 0$$

$$= \underline{62}$$

3.11]

$$\begin{array}{rcll}
 151 & \rightarrow & 10010111 & \rightarrow \cancel{01101000} \\
 214 & \rightarrow & 11010110 & \rightarrow \cancel{00101001} \\
 + & & \underline{} & \\
 255 & & 11111111 &
 \end{array}$$

This is not required
beoz we are using unsigned

As question says unsigned, 255 is the highest number in a range for unsigned.

3.20

pattern 0x0C000000 2's complement

let us convert this into Bin

0000 1100 0000 0000 0000 0000 0000 0000

Reversing 2's complement

~~But~~ But since this number starts with 0b00 it is positive

∴ 1100 0000 0000 0000 0000 0000 0000 0000

Converting into Decimal.

$$= 2^{25} \times 1 + 2^{12} \times 1 + 0$$

$$= 201326592$$

The Answer is the same for unsigned integer because the number happens to be +ve.

3.21) Instruction Register.

0C 000 000

0000 1100 0000 0000 0000 0000 0000 0000

opcode + target

~~(6 bits)~~ 6 bits

26 bits

[31-25]

[24-0]

00 00 11 000000 00000000 0000 0000 0000 0000

From MIPS instruction sheet we recognise

000011 \rightarrow JAL

So Jump instruction will be executed & program will jump to target address

OC ○ ○ ○ ○ ○ ○

0000 1100 0000 0000 6000 0000 0000 0000

August 16, 1900

$$FP = (-1)^S \times (1+F) \times 2^{(E-\text{bias})}$$

Sign + Exponent + Fraction

0 → 000 11 000 000 0000 00000000 0000 0000

2. $\frac{1}{2} \times 2 = 1$

$$= (-1)^0 \times (1 + 0000000 \dots 0) \times 2^{\left(\frac{24}{8} - 127\right)}$$

$$= 1.0 \times 10^{-3}$$