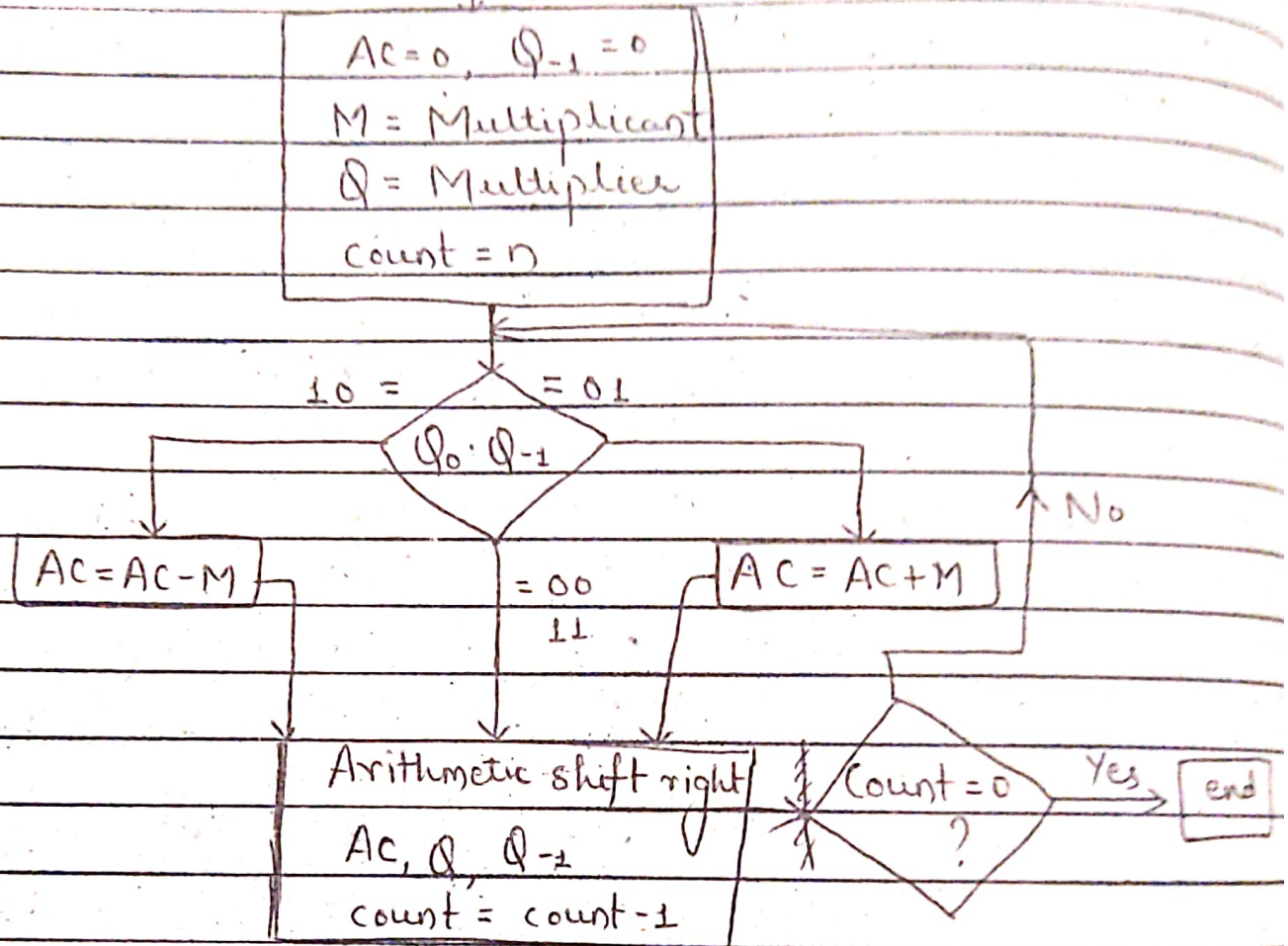


Booth Algorithm: - Start



Ques) Multiply  $(-7)$  and  $(3)$  using BA (Register size = 5)

	Ac	Q	Q <sub>-1</sub>	Operation
1 <sup>st</sup>	00000	00011	0	Ac = Ac - M = 00000
	00111	00011	0	+ 00111
	00011	10001	1	00111
2 <sup>nd</sup>	00001	11000	1	A.S.R
3 <sup>rd</sup>	11010	11000	1	Ac = Ac + M = 00001
	11101	01100	0	110001
				11010

$$\begin{aligned}
 7 &= 0011100111 \\
 &= 11000 \rightarrow 1's \text{ complement} \\
 &\quad + \quad 1 \\
 (-7) &= 11001 \rightarrow 2's \text{ complement}
 \end{aligned}$$

4th 11110 10110 0 ASR

5th 11111 01011 1 ASR

$$(1111101011)_2 \quad (-21)$$

$$0000010100 \quad - 1's \text{ comp.}$$

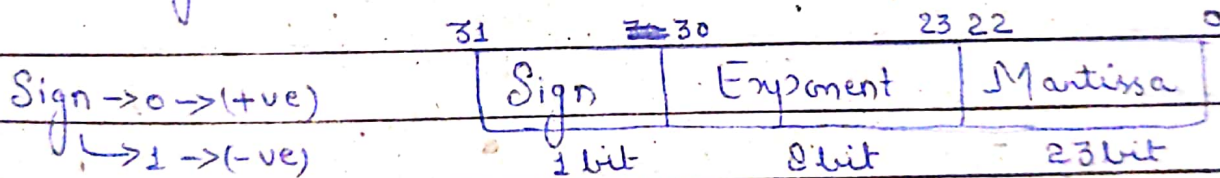
$$+ \quad 1$$

$$0000010101 \quad (21)$$

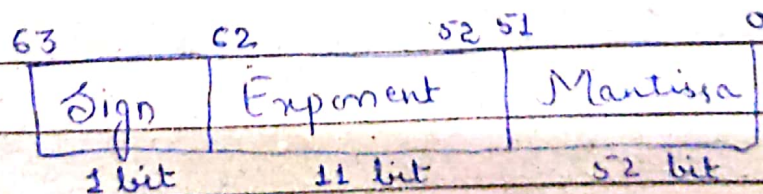
$$M(-7) = 11001 \quad Q = 00011, \quad -M(7) = 00111$$

IEEE 754 Floating Point number representation

a) Single Precision Format - 32 bits



b) Double Precision Format - 64 bit



Ques) Represent  $(1259.125)_{10}$  in single & double precision format.



$$\begin{array}{r} 1024 \\ 128 \\ \hline 1152 \\ 96 \\ \hline 1248 \end{array}$$

$$\begin{array}{r} 1024 \quad 512 \\ 256 \\ \hline 1280 \\ 16 \\ \hline 1296 \end{array}$$

PAGE NO. 1  
DATE: / /

10011101011

Step 1 :- Convert decimal to binary.

$$(1259)_{10} = 10011101011$$

$$(0.125)_{10} = 001$$

$$(1259.125)_{10} = 10011101011.001$$

Step 2 :- Normalize the number.

$$\text{Single} - (1.N)E^{-127}$$

$$\text{Double} - (1.N)E^{-1023}$$

$$\left\{ \begin{array}{l} \text{normalize} = \\ 1.0011101011001 \end{array} \right.$$

$$1.0011101011001 \times 2^{10}$$

Step 3: (i) Single precision.

$$(1.N)E^{-127}$$

$$E^{-127} = 10$$

$$E = 137$$

$$(137)_{10} = (10001001)_2$$

S	E	M
0	10001001	001110101100100000000000

exponent me  
piche bit  
lgate hai

mantissa me aage bit  
lgate hai

(ii) ~~Double~~ Double Precision.

$$(1.N)E^{-1023}$$

$$E = 1023 = 10$$

$$E = 1033$$

$$(1033)_{10} = (10000001001)_2$$

S	E	M
0	10000001001	00111010110010...

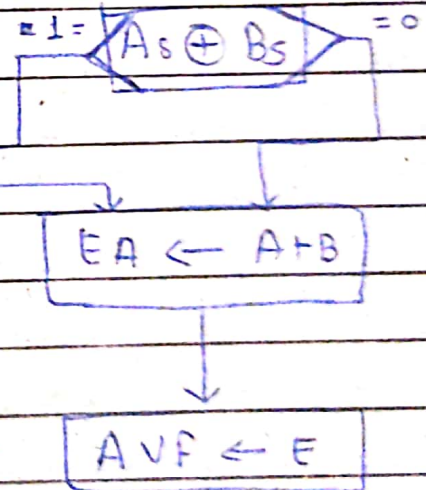
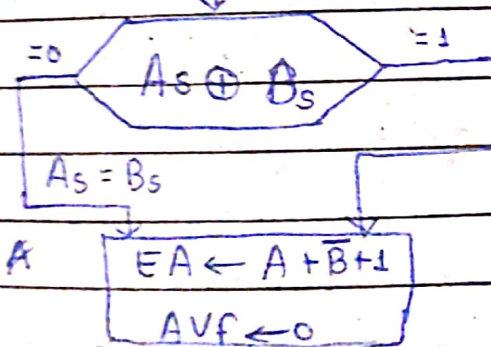
## ⇒ Addition and Subtraction Algorithm :-

Subtraction operation

Addition operation

Minuend in A  
Subtrahend in B

Augend in A  
Addend in B



EA - extended accumulator

End  
Result is in A & As



$$\begin{array}{cc} (6) - (5) \\ A & B \end{array}$$

$$6 = 0110$$

$$5 = 0101$$

$$(-5) = 1011$$

$$0110$$

$$0101$$

$$\boxed{1} \quad 0001$$

E

A

$A_s$

A

0	0001
---	------

// Ans

$$\begin{array}{cc} (5) - (6) \\ A & B \end{array}$$

$$A = 5 = 0101$$

$$6 = 0110$$

$$(-6) = 1010$$

$$0101$$

$$1010$$

$$\boxed{10} \quad 1111$$

E

A

$$\bar{A} = 0000$$

$$+ 1$$

$$\underline{0001}$$

$$A_s = 0$$

$$\bar{A}_s = 1$$

$A_s$	A
1	0001

// Ans

$$A = 6 = 0110$$

$$B = 5 = 0101$$

$$A_s = 0$$

$$B_s = 0$$

$$(6) + (5)$$

$$0110$$

$$0101$$

$$\boxed{0} \quad 01011$$

E

A

$A_s$	A
0	1011

// Ans