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COA

Assignment :- 04

Q.1 using booth's algorithm multiply the following
Multiplicand = 7.
Multiplier = 3

→ $M = (7)_{10} \longrightarrow 0111$
$Q = (3)_{10} \longrightarrow 0011$
$A = 000$
$-M$ (2's complement of $+M$)
$-M = 0111 = 1001$

$$\left(\begin{array}{r} 1000 \\ +\quad 1 \\ \hline 1001 \end{array}\right)$$

Register size = 4, cycle = 4
Q-1 = 0

Cycle	A	Q	Q-1	operation
1st cycle	0000	0011	0	① Q. Q-1 = 10 A = A-M $\left(\begin{array}{r} 0000 \\ 1001 \\ \hline 1001 \end{array}\right)$
	1001	0011	0	
	1100	1001	1	② A.S.R.
2nd cycle	1100	1001	1	Q. Q-1 = 11 ① A.S.R.
	~~1110~~			
	1110	0100	1	

3rd cycle	0101	0100	1	① Q.Q-1 = 01 A = A+M (1110 0111) 1 0101
	0010	1010	0	② ASR.
4th cycle	0010	1010	0	Q.Q-1 = 00
	0001	0101	0	① ASR

$00010101 = 2^4 + 2^2 + 20 = 16 + 4 + 1 = 21$

Q.2] Performing division of the following numbers using restoring division algorithm.

dividend = 1011

divisor = 0011

→ Q = 1011

M = 00011

n+1 bits - one additional bit handle borrow

-M = 11100

	C	AC	Q		
	0	0000	1011	- Initial	
1st cycle	0	0001	0111	Shift left	C, AC = 00001
	1	1110	0111	Substract AC = AC - M	- M = 11101
	0	~~0001~~ 0001	0111		+ 1 = 11110
2nd cycle	0	0010	1110	Shift left	AC = 00010
	1	1111	1110	Substract AC = AC - M	- M = 11101 = 1111 1
	0	0010	1110	restore	
3rd cycle	0	0101	1001	Shift left	AC = 00101
	1	0010	1001	AC = AC - M	- M = 11101 = 00010
4th cycle	0	0101	0011	Shift left	AC = 00101
	1	0010	0011	Substract AC = AC - M	- M = 11101 = 00010

Remainder = 0010 = 2

Quotient = 0011 = 3

Q.3 Express $(-10.100)_{10}$ in IEEE 754 single and double precision Standard of Floating Point Number representation.

→ $(-10.100)_{10} = (-1010.000110001001100111)_2$

2	10	
2	5	0
2	2	1
2	1	0
	0	1

$0.1 \times 2 = 0.2 \cdot 0$
$0.2 \times 2 = 0.4 \quad 0$
$0.4 \times 2 = 0.8 \quad 0$
$0.8 \times 2 = 1.6 \quad 1$
$0.6 \times 2 = 1.2 \quad 1$

$\therefore (-1010.000110011001100111)_2 =$

$-1.01000011001100111001 \times 2^3$

Single Precision

$(1 \times N) \times 2^{E-127} \quad \therefore E - 127 = 3$

$Exp = 127 + 3 = (130)_{10} \quad (10000010)_2$

Mantissa = 01.00001100110011001001

Double Precision

~~Double Precision~~

Double Precision

$(1.N) \times 2^{E-1023}$

$E - 1023 = 3$

$E = 1023 + 3 = 1026$

$EXP = (1026)_{10} = (1000000)_2$

Mantissa

$= 01000001100110011001100110011001100110011$

00110011001100110011