Assignment 1

Q1] Perform the following

1) Convert $(340)_{10}$ to excess 3 code

$(340)_{10} = (001101000000)_{BCD} = (0110\ 0111\ 0011)$

2) Convert hexadecimal to decimal DADA

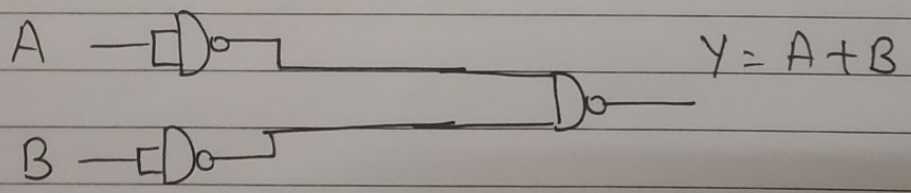
A = 10
D = 13

$10 \times 16^0 + 13 \times 16^1 + 10 \times 16^2 + 13 \times 16^3$

$10 + 208 + 2560 + 53248$

$= (56026)_{10}$

3) Draw OR gate using NAND gates



4) Hexadecimal to Binary 3A9D.A0C

3 A 9 D . A 0 C

0011 1010 1001 1101 . 1010 0000 1100

$(0011\ 1010\ 1001\ 1101 . 1010\ 0000\ 1100)_2$

5) To express $(52)_{10}$ into Gray

2	52	
2	26	0
2	13	0
2	6	1
2	3	0
	1	1

$\therefore (52)_{10} = (110100)_2$

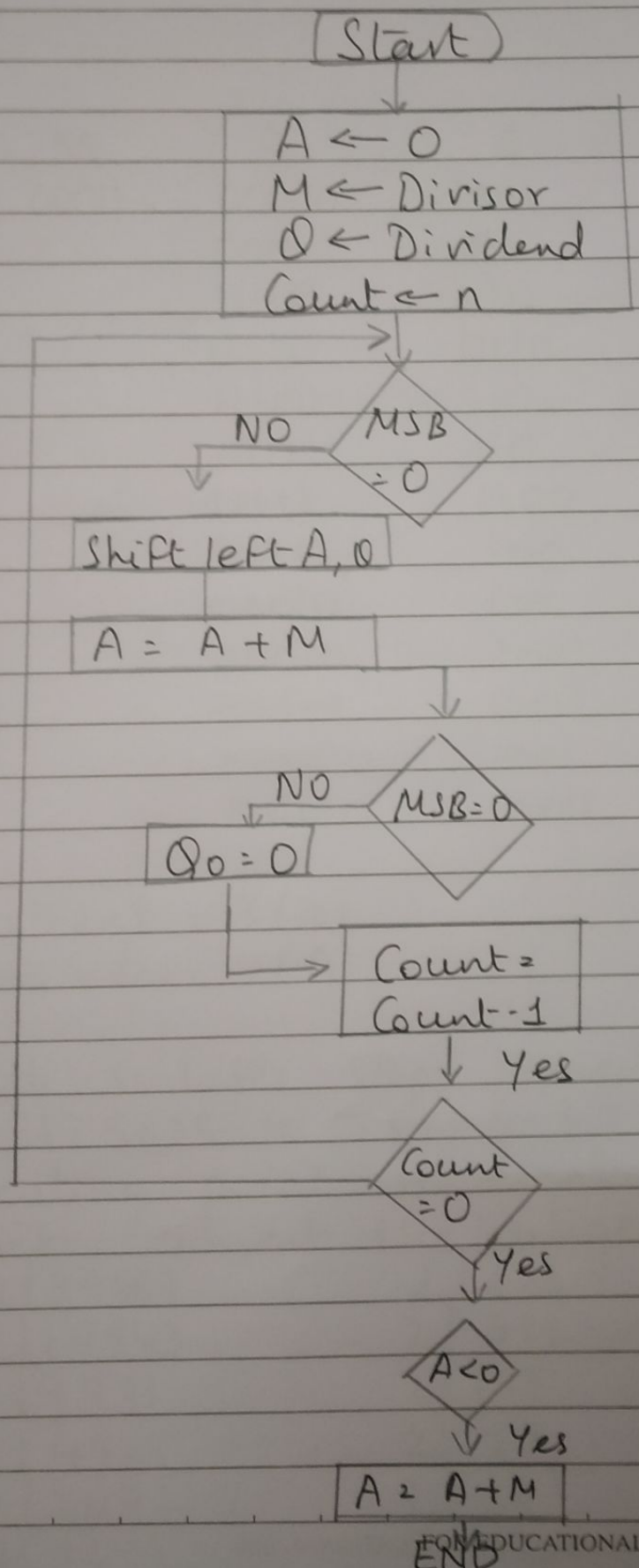
Binary 1 ⊕ 1 ⊕ 0 ⊕ 1 ⊕ 0 ⊕ 0

↓ ↓ ↓ ↓ ↓ ↓

1 0 1 1 1 0

$(52)_{10} = (101110)_{Gray}$

(12) Draw flowchart for non restoring division algorithm and perform the division 11/3 using non restoring division algorithm



11/3

N	M	A	Q	Action
4	00011	00000	1011	Start
		00001	011_	left Shift AQ
		11110	011_	A = A-M
3		11110	0110	Q[c] = 0
		11100	110_	left shift AQ
		11111	110_	A = A+M
2		11111	1100	Q[0] = 0
		11111	100_	left Shift AQ
		00010	100_	A - A+M
1		00010	1001	Q[0] = 1
		00101	001_	left shift AQ
		00110	001_	A = A-M
0		00010	0011	Q[0] = 1

Quotient = 3(Q)
Remainder = 2(A)

Q3) With suitable steps convert decimal number 39887.5625 to IEEE 4-bit. Double precision floating point representation.

→ First convert the integer to binary

2	39887	2	623	2	19
2	19943	2	311	2	9
2	9971	2	155	2	4
2	4985	2	77	2	2
2	2492	2	38		1
2	1246	2	19		

$(39887)_{10} = (1001\ 1011\ 1100\ 1111)_2$

Convert the decimal part to binary

$0.5625_{(10)} = 0.1001_{(2)}$

Positive number before normalization

$39557.5625_{(10)} = 1001\ 1011\ 1100\ 1111.1001_{(8)}$

Normalizing

$1001\ 1011\ 1100\ 1111.1001_{(2)} \times 2^0 =$

$1.0011\ 0111\ 1001\ 1110\ 01_{(2)} \times 2^{15}$

Adjusting the exponent

Exponent adjusted : $15 + 2^{(11-1)} - 1 =$

$: (15 + 1023)$

$= 1038_{(10)}$

Converting the exponent from decimal

2 | 1038	
2 | 519	
2 | 259	
2 | 129	
2 | 64	
2 | 32	
2 | 16	

2 | 2	
1	

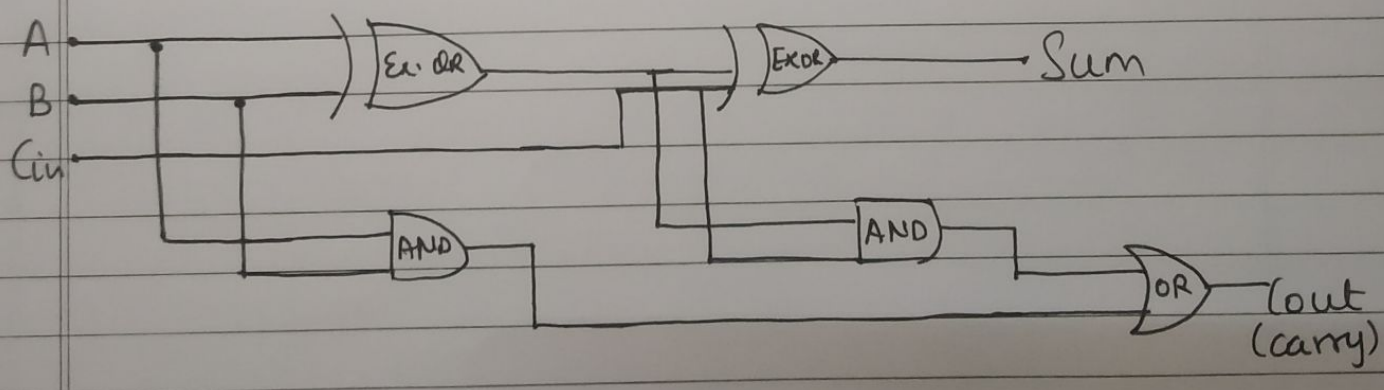
$1038_{(10)} = 100\ \ 0000\ 1110_{(2)}$

Removing leftmost bit and decimal
Adjusting length by adding zeroes to right

001 1011 1100 1111 · 1001 0000 0000 0000 0000
0000000000000000 =
0011 0111 1001 1111 0010 0000 0000 0000 0000
0000 0000 0000 0000

$39.857.5625_{(10)} = 0 \div 100\ 000\ 1110 \div 0011\ 0111\ 100)$
1111 0010 0000 0000 0000 0000 0000 0000
0000 0000 (64 bit IEEE 754)

(04) Design a full adder using half adder and additional gates



$Cout = BC_{in} + AC_{in} + AB$

$Sum = A \oplus B \oplus C_{in}$

Truth Table

Inputs			Outputs	
A	B	Cin	Sum	Carry
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1