COA ASSIGNMENT

Done By,

Harikrishnan.V

CS-4A

Roll No: 27

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1. What is the decimal value of

(i) 1011111001000000

(ii) 0100000100100110000

in Single Precision Float?

ans.

(i)

1	01111100	10000000

Sign bit = 1 ⇒ No. is negative

$E' = (01111100)_2 = (64+32+16+8+4)_{10} = 124 \Rightarrow E = 124 - 127 = -3$

$M = -1.1 \Rightarrow \text{No.} = -1.1 \times 2^{-3} = -(0.0011)_2 = -(0+0+0+0.125+0.0625)_{10}$

$= -0.1875$

(ii)

0	10000010	010011000

Sign bit = 0 ⇒ No. is positive

$E' = (10000010)_2 = (128+2)_{10} = 130 \Rightarrow E = 130 - 127 = 3$

$M = +1.010011 \Rightarrow \text{No.} = +1.010011 \times 2^3 = +(1010.011)_2$

$= +(8+0+2+0+0+0.25+0.125)_{10}$

$= +10.375$

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2. Convert -0.8125 to binary in single & double precision.

ans. $(-0.8125)_{10}$

Given no. is negative $\Rightarrow$ sign bit = 1

Converting 0.8125 to binary,

$0.8125 \times 2 = 1.625$

$0.625 \times 2 = 1.25$

$0.25 \times 2 = 0.5$

$0.5 \times 2 = 1.0$

$(0.8125)_{10} = (0.1101)_2$

Value of number in IEEE notation is,

$0.1101 - 1.101 \times 2^{-1} \Rightarrow M = 101$

$E = -1 \Rightarrow E' = -1 + 127 = 126 = (1111110)_2$

IEEE notation is,

Sign 1 bit	Exponent 8 or 11 bits	Mantissa 23 or 52 bits

IEEE Single Precision Notation

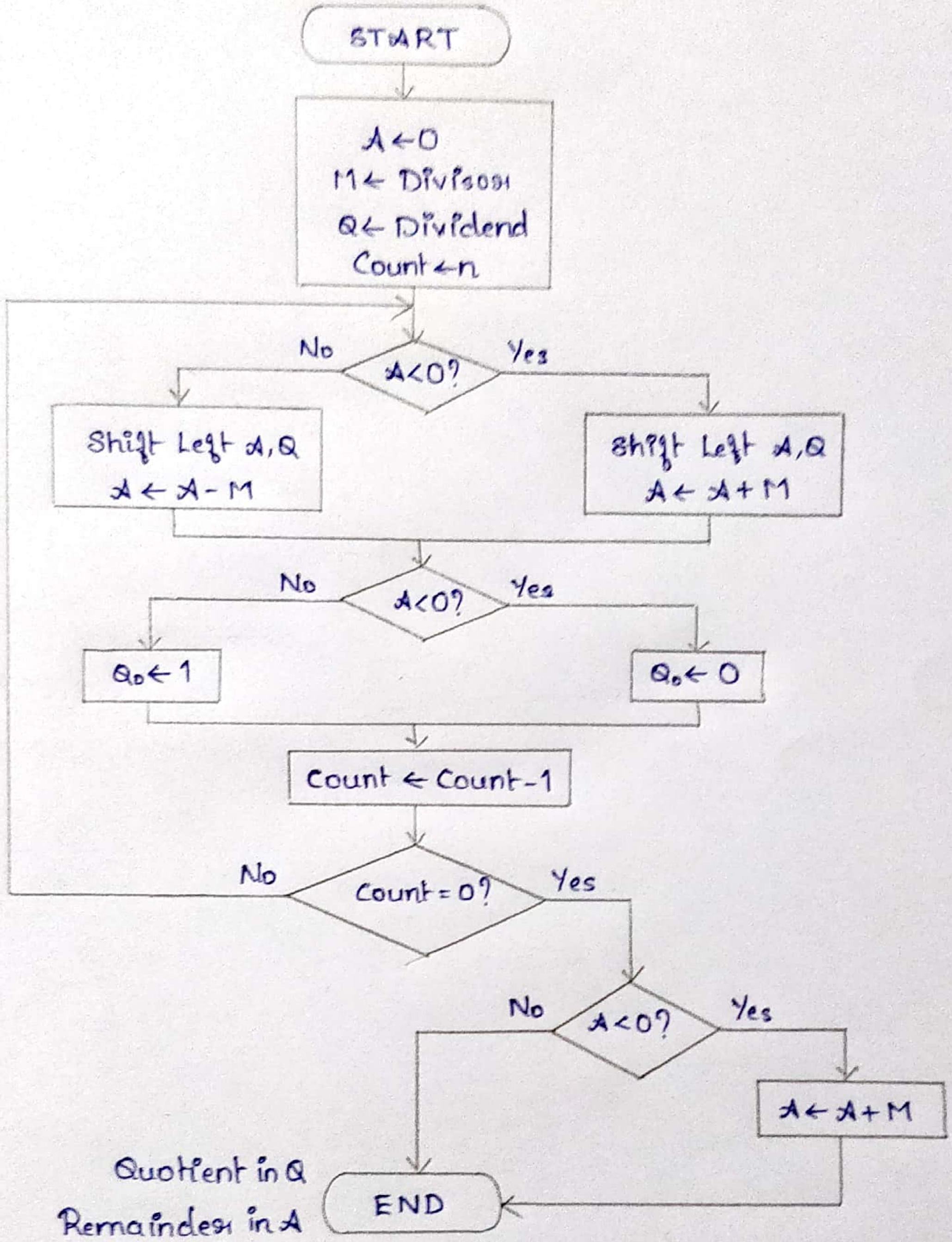
1	01111110	10100000000000000000000

IEEE Double Precision Notation

1	00001111110	1010000000000000000000000000000000000000000000000000

3. With the help of a flowchart, illustrate the non-restoring division method for unsigned integer 11/3

ans.



Given

Q= 1011

M= 00011

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	A	Q	M	
Initially	00000	1011	00011	
Shift	00001	011□		1st cycle
A = A − M	11110			
	11110	0110		
Shift	11100	110□		2nd cycle
A = A + M	11111			
	11111	1100		
Shift	11111	100□		3rd cycle
A = A + M	00010			
	00010	1001		
Shift	00101	001□		4th cycle
A = A − M	00010			
	00010	0011		
	Remainder	Quotient		

Quotient, Q = $(0011)_2 = (3)_{10}$

Remainder, A = $(00010)_2 = (2)_{10}$

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4. Design a 2*3 array multiplier.

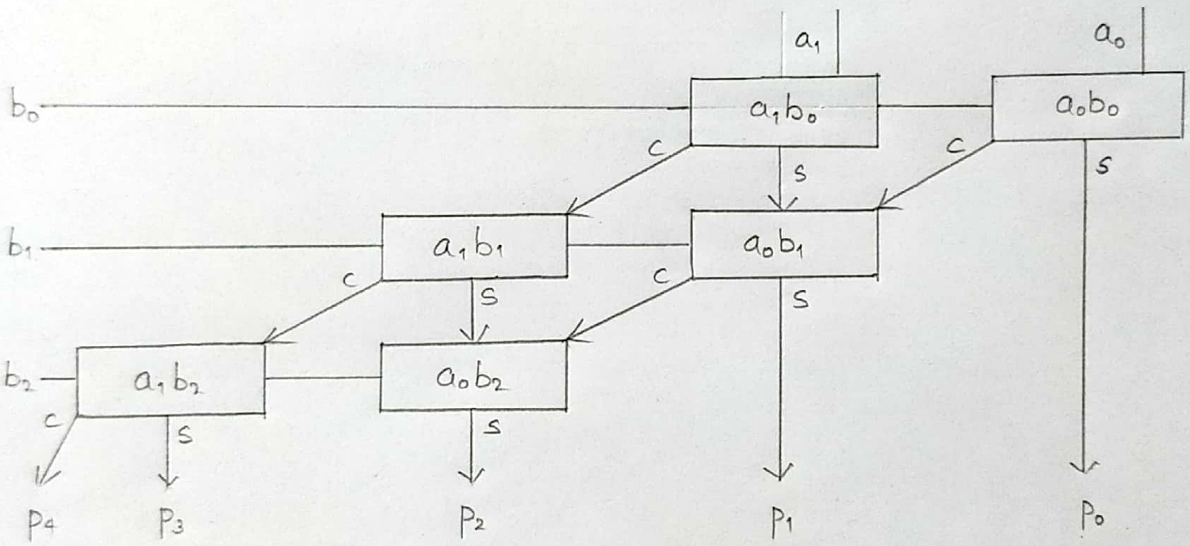
ans. A 2*3 array multiplier needs,

2*3 = 6 AND gates, 3 Half Adders

Let the two numbers be A & B where $A = a_1 a_0$, $B = b_2 b_1 b_0$

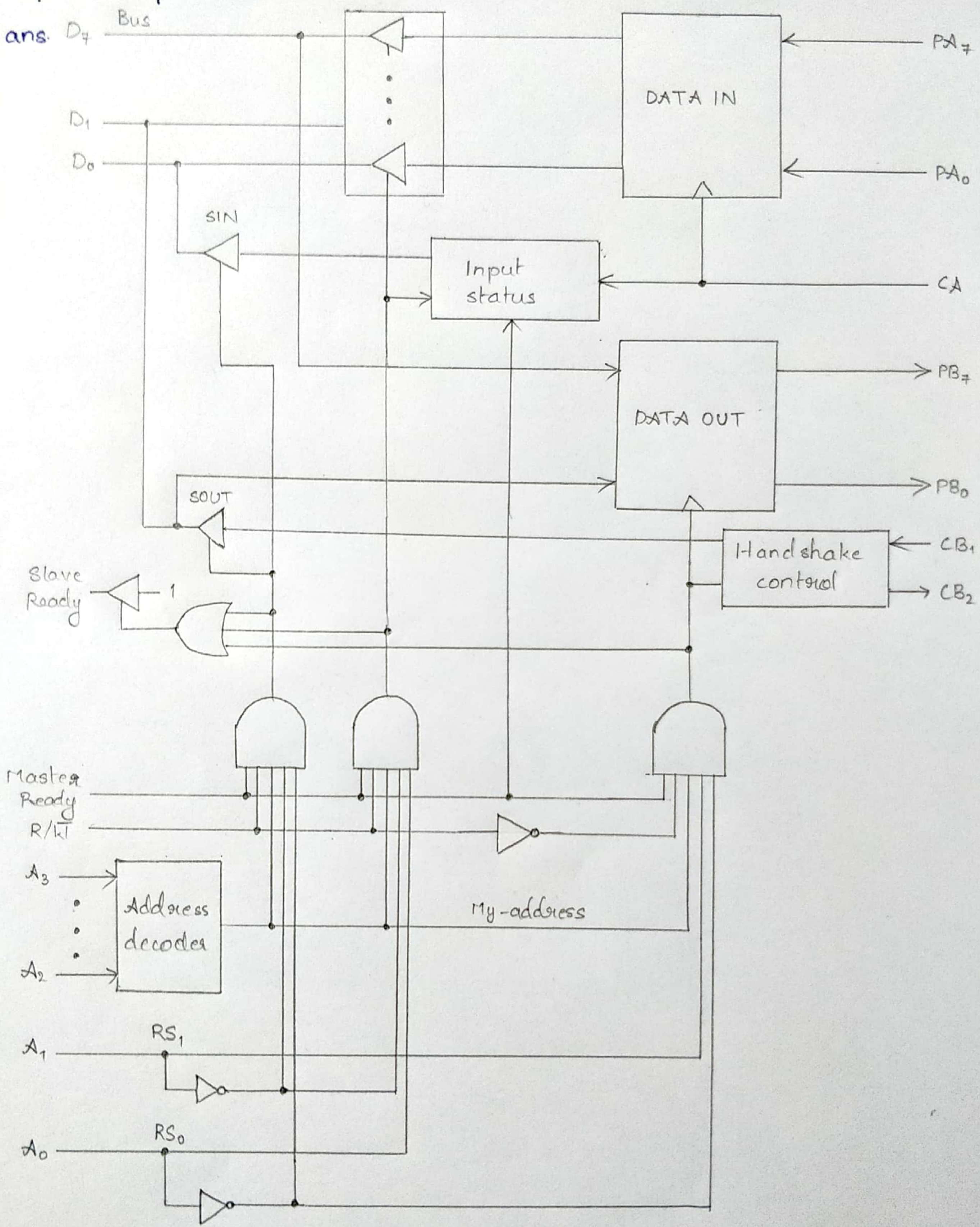
$A \times B \Rightarrow$

			a_1	a_0
		b_2	b_1	b_0
			a_1b_0	a_0b_0
		a_1b_1	a_0b_1	
	a_1b_2	a_0b_2		
P_4	P_3	P_2	P_1	P_0



5. Illustrate the combined input/output interface circuit for a parallel port.

ans.



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6. With the help of an example, explain distributed arbitration scheme.

ans. Bus arbitration is the process by which next device to become bus master is selected.

Distributed Arbitration

→ All devices waiting to use the bus has to carry out the arbitration process - no central arbiter.

→ Each device on the bus is assigned with a 4-bit identification number.

→ 1 or more devices request the bus by asserting the start-arbitration signal & place their identification number on the 4 open collector lines.

→ ARB0 through ARB3 are the 4 open collector lines

→ 1 among the 4 is selected using the code on the lines & 1 with the highest ID number.

Eg: Assume that 2 devices, A & B, having ID numbers 5 & 6, respectively, are requesting the use of the bus.

Device A transmits the pattern 0101, & device B transmits the pattern 0110.

The code seen by both devices is 0111.

Each device compares the pattern on the arbitration lines to its own ID, starting from the most significant bit.

If it detects a difference at any bit position, it disables its drivers at that bit position & for all lower-order bits, It does so by placing a 0 at the input of these drivers.

In the case of our example, device A detects a difference on line ARB1. Hence, it disables its drivers on lines ARB1 & ARB0.

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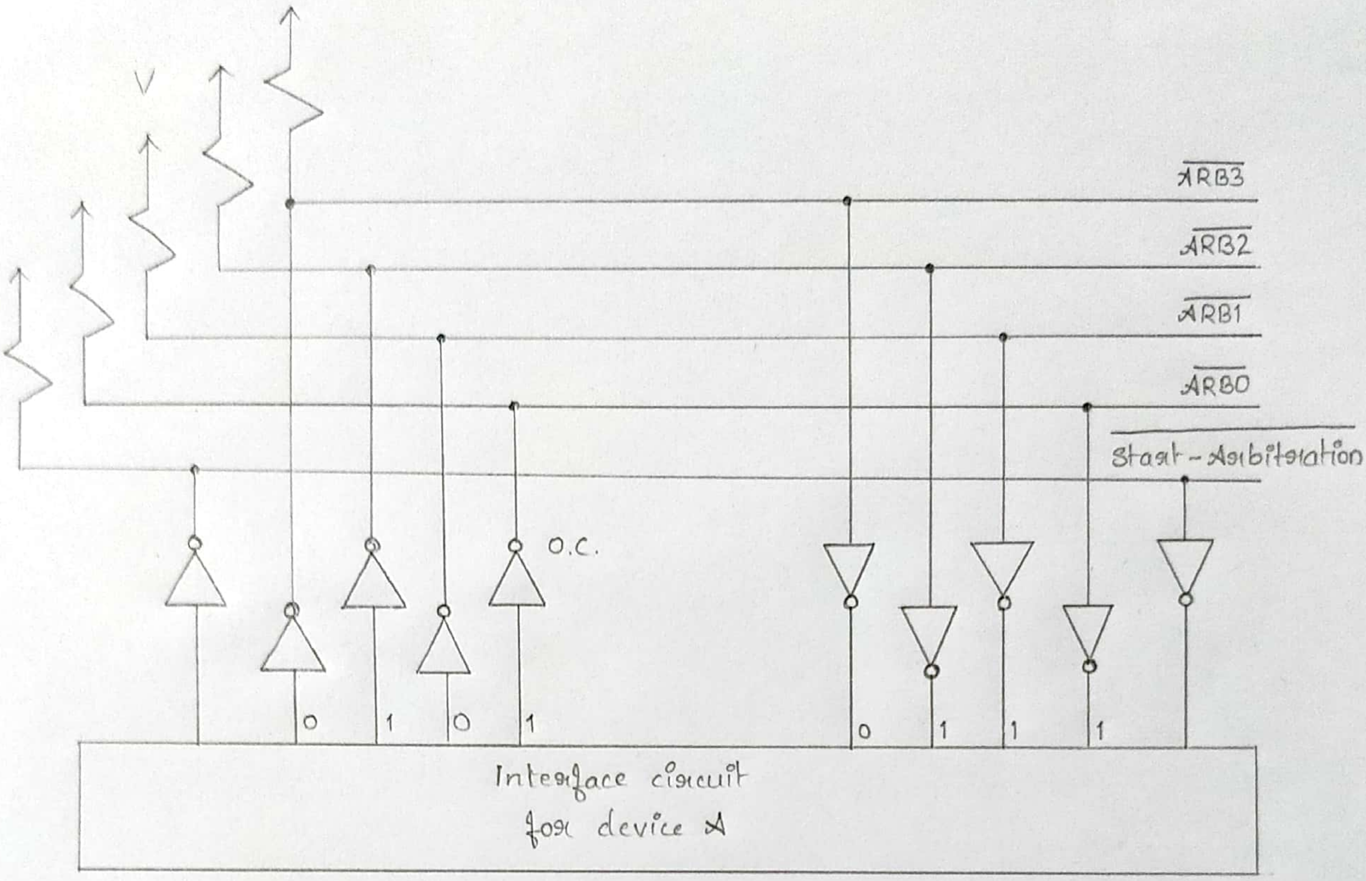

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