

Signature of

Batch:B2 Roll No.: 16010121110

Experiment / assignment / tutorial

No. __3__

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of the Staff In-charge with date

TITLE : To study and implement Restoring method of division

AIM : The basis of algorithm is based on paper and pencil approach and the operation involves repetitive shifting with addition and subtraction. So the main aim is to depict the usual process in the form of an algorithm.

Expected OUTCOME of Experiment: (Mention CO /CO's attained here)

Describe and define the structure of a computer with buses structure and detail working of the arithmetic logic unit and its sub modules

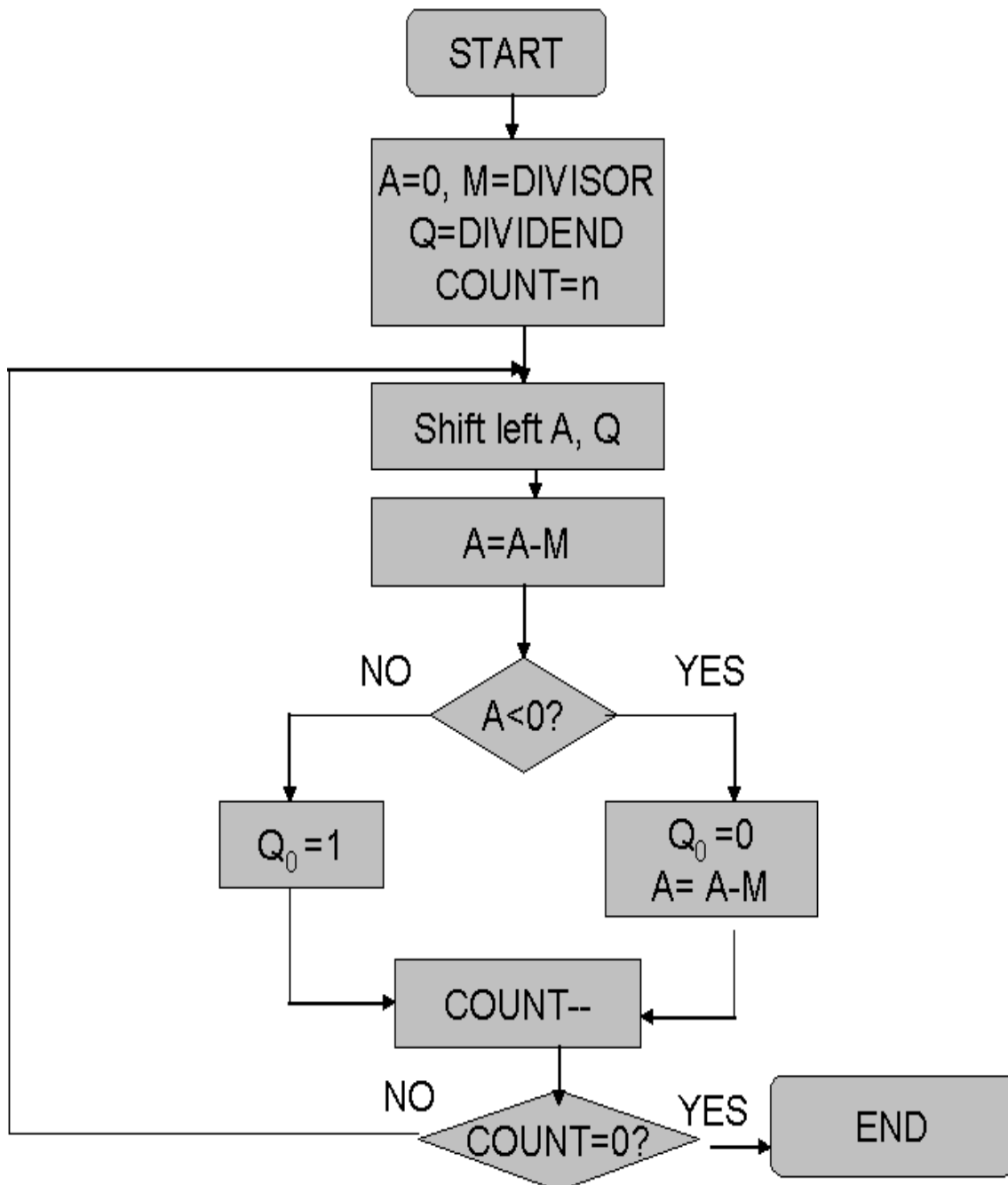
Books/ Journals/ Websites referred:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, TataMcGraw-Hill.
2. William Stallings, "Computer Organization and Architecture: Designing for Performance", Eighth Edition, Pearson.
3. Dr. M. Usha, T. S. Srikanth, "Computer System Architecture and Organization", First Edition, Wiley-India.

Pre Lab/ Prior Concepts:

The Restoring algorithm works with any combination of positive and negative numbers.

Flowchart for Restoring of Division:



Design Steps:

1. Start
2. Initialize $A=0$, $M=\text{Divisor}$, $Q=\text{Dividend}$ and $\text{count}=n$ (no of bits)
3. Left shift A, Q
4. If MSB of A and M are same
5. Then $A=A-M$
6. Else $A=A+M$
7. If MSB of previous A and present A are same
8. $Q_0=0$ & store present A
9. Else $Q_0=1$ & restore previous A
10. Decrement count.
11. If $\text{count}=0$ go to 11
12. Else go to 3
13. STOP

Example:- (Handwritten solved problems needs to be uploaded)



SOMAIYA
VIDYAVIHAR UNIVERSITY

K J Somaiya College of Engineering

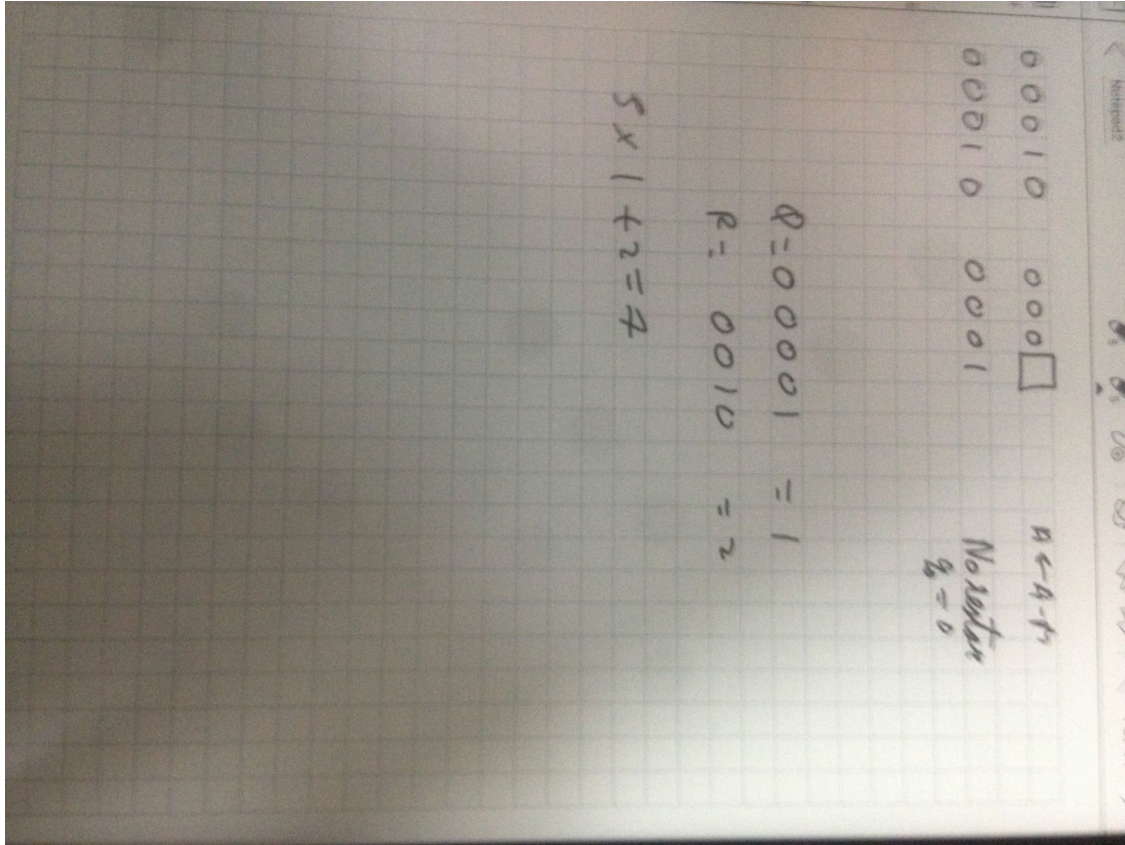
K. J. Somaiya College of Engineering, Mumbai-77
(A Constituent College of Somaiya Vidyavihar University)
Department of Computer Engineering



① Divide 7 by 5 using Restoring division

$n = 4$

A	Q	Initial	$n =$
00000	0111	(Initial)	4
00000	1111	Shift left	3
11011	1111	$A \leftarrow A - M$	
00000	1110	Restore $q_3 = 0$	2
00001	1100	$A \leftarrow A - M$	
11100	1100	Restore $q_2 = 0$	
00001	1100	Shift left	1
11110	1000	$A \leftarrow A - M$	
00011	1000	Restore $q_1 = 0$	
00111	0000	Shift left	0



Conclusion:

Thus we have understood how restoring division works. Restoring division works using addition and subtraction using addition of complement. Using this method, we can divide two numbers within a given bit range. Example for 4 bits, we can divide two 3 bit numbers. (From 1-7)

Post Lab Descriptive Questions

1. **What are the advantages of restoring division over non restoring division?**
One extra bit must be maintained in the partial remainder to keep track of the sign in case of non restoring division. This overhead is not present in restoring division.

Date: 29 sept 22

Signature of faculty in-charge