# COMPUTER ORGANIZATION AND ARCHITECTURE
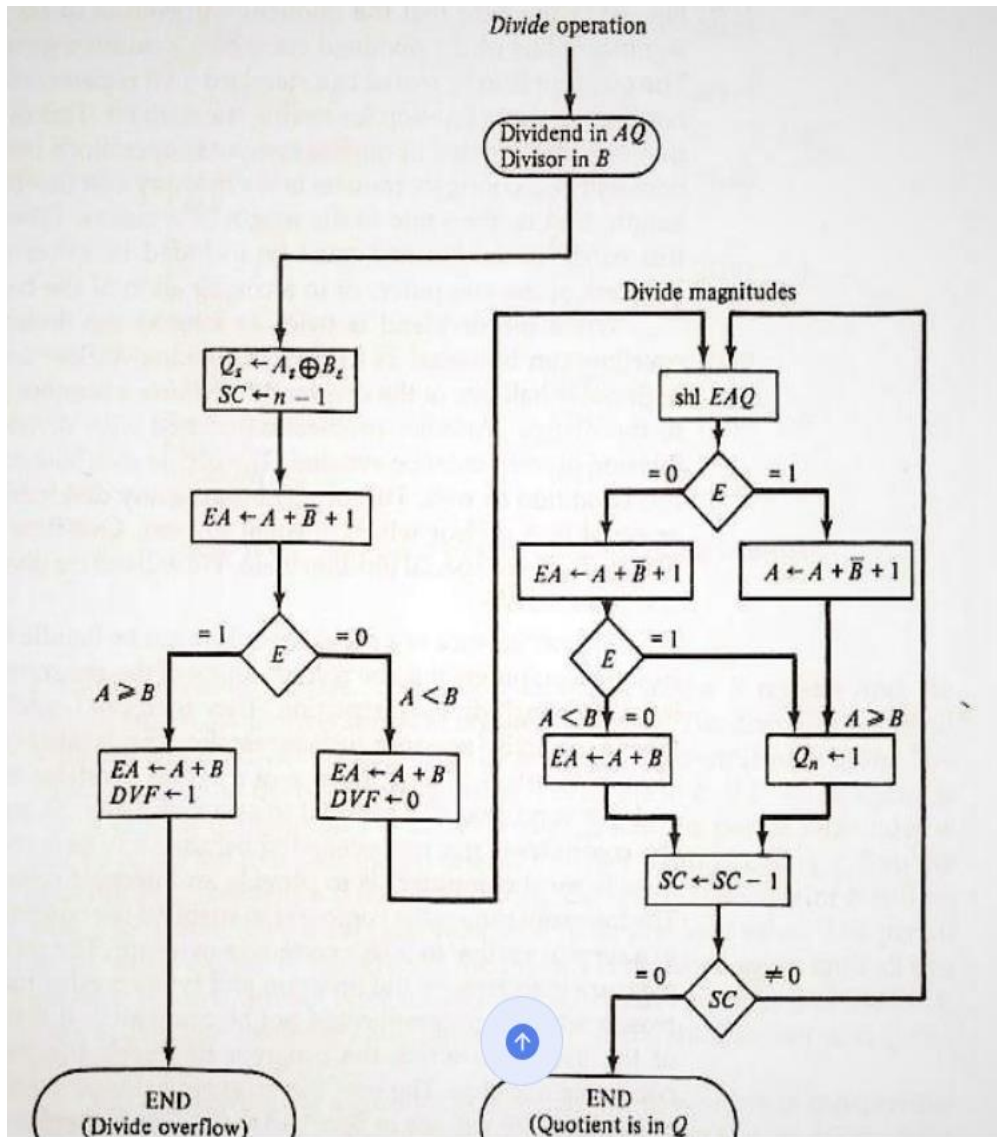## UNIT –III
## TOPIC- DIVISION OF SIGNED MAGNITUDE DATA PART-3

## Signed magnitude Division
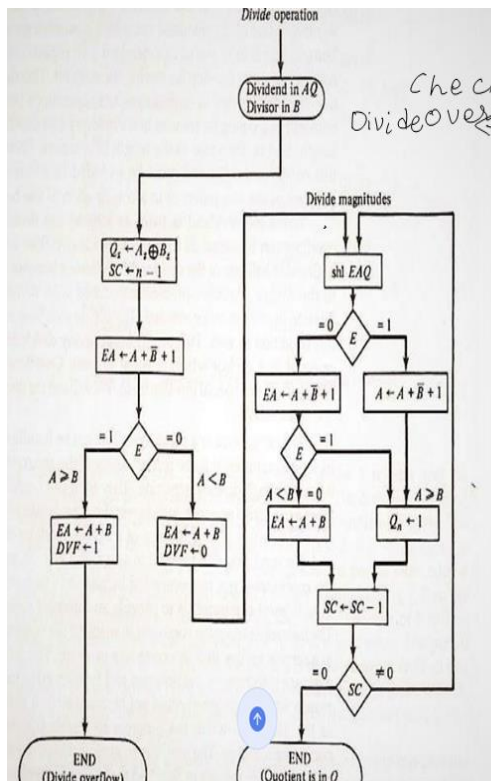
**Flowchart:**



## Example 1:

Divisor B = 10001, Dividend A = 0111000000

Check for Divide overflow:



Handwritten notes (right side):

Ex: Divisor $B = 10001$  $B_S = 0$

Check for Divident $= \underbrace{01110}_{A} \underbrace{00000}_{Q}$
Divide overflow

$Q_S \leftarrow A_S \oplus B_S = 0 \oplus 0 = 0$.  $A_S = 0$  $Q_S = 0$

$SC \leftarrow n-1 = 5$

$EA \leftarrow A + \bar{B} + 1$          $B = 10001$

$A = 01110$          $\bar{B} = 01110$

$\begin{array}{r} 01110 \\ 01111 + \\ \hline \end{array}$          $+1$

$E \rightarrow 0 \quad A \rightarrow 11101$          $\bar{B}+1 = \overline{01111}$

if $E = 0$, $A < B$, $DVF \rightarrow 0$.

$EA \leftarrow A + B$

$A = 11101$

$B = 10001 +$

$E \leftarrow 1 \overline{|01110} \rightarrow A$

Divide Magnitudes:

| Divisor B = 10001 | E | A | Q | SC |
|---|---|---|---|---|
| Dividend:<br>shl $EAQ$<br>add $\bar{B} + 1$ | <br>0<br> | 01110<br>11100<br>01111 | 00000<br>00000<br> | 5 |
| $E = 1$<br>Set $Q_n = 1$<br>shl $E\,AQ$<br>Add $\bar{B} + 1$ | 1<br>1<br>0<br> | 01011<br>01011<br>10110<br>01111 | <br>00001<br>00010<br> | 4 |
| $E = 1$<br>Set $Q_n = 1$<br>shl $E\,AQ$<br>Add $\bar{B} + 1$ | 1<br>1<br>0<br> | 00101<br>00101<br>01010<br>01111 | <br>00011<br>00110<br> | 3 |
| $E = 0$; leave $Q_n = 0$<br>Add $B$ | 0<br> | 11001<br>10001 | 00110<br> | 2 |
| Restore remainder<br>shl $E\,AQ$<br>Add $\bar{B} + 1$ | 1<br>0<br> | 01010<br>10100<br>01111 | <br>01100<br> |  |
| $E = 1$<br>Set $Q_n = 1$<br>shl $E\,AQ$<br>Add $\bar{B} + 1$ | 1<br>1<br>0<br> | 00011<br>00011<br>00110<br>01111 | <br>01101<br>11010<br> | 1 |
| $E = 0$; leave $Q_n = 0$<br>Add $B$ | 0<br> | 10101<br>10001 | 11010<br> |  |
| Restore remainder<br>Neglect $E$<br>Remainder in $A$:<br>Quotient in $Q$: | 1<br><br>| 00110<br><br>00110<br> | 11010<br><br><br>11010 | 0 |

**Final Remainder:** 00110
**Final Quotient:** 11010

1. Show the contents of registers E, A, Q, and SC during the process of division of
(a) 10100011 by 1011;
(b) 00001111 by 0011. (Use a dividend of eight bits.)