Binary Multiplication & Division

By

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Topics to be Covered

Binary Multiplication:

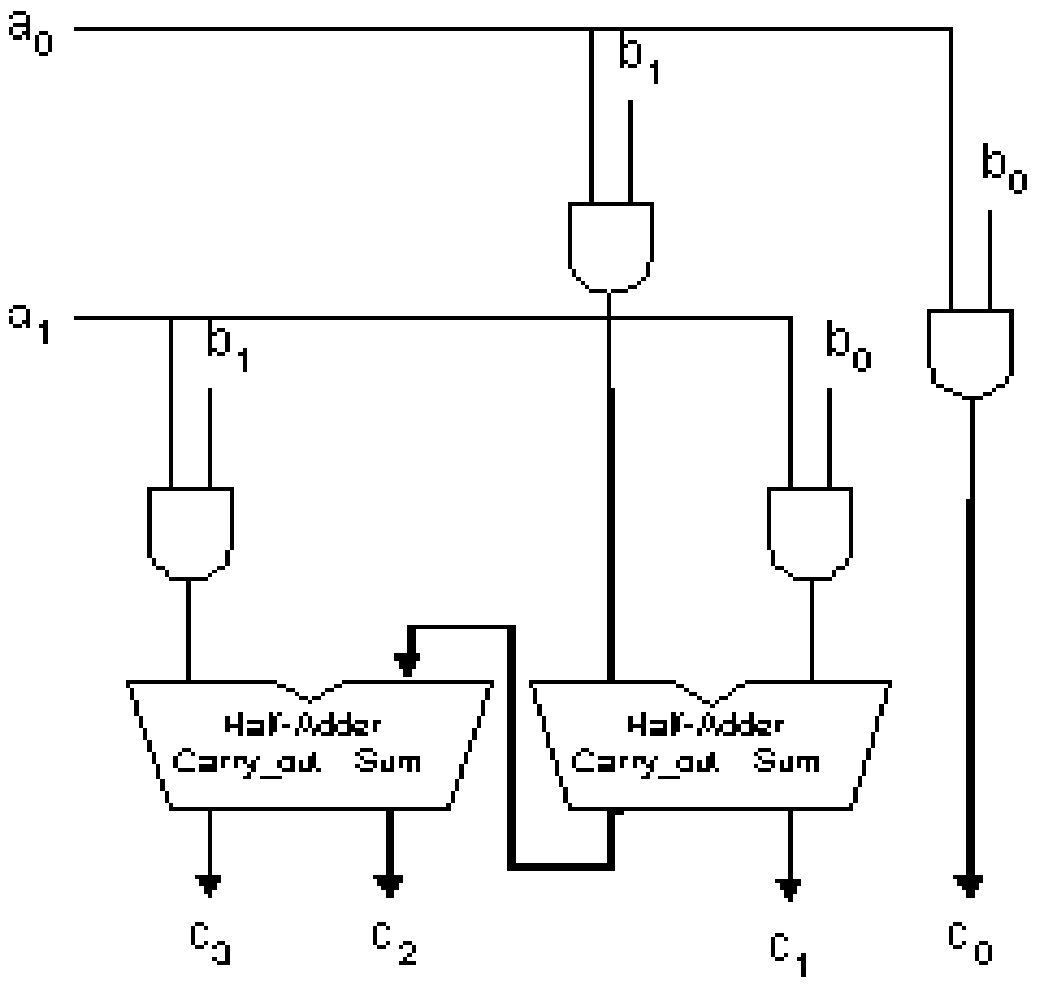
1. Sequential Multiplier for Unsigned Numbers
2. Booth's Multiplier for Signed Numbers

Binary Division:

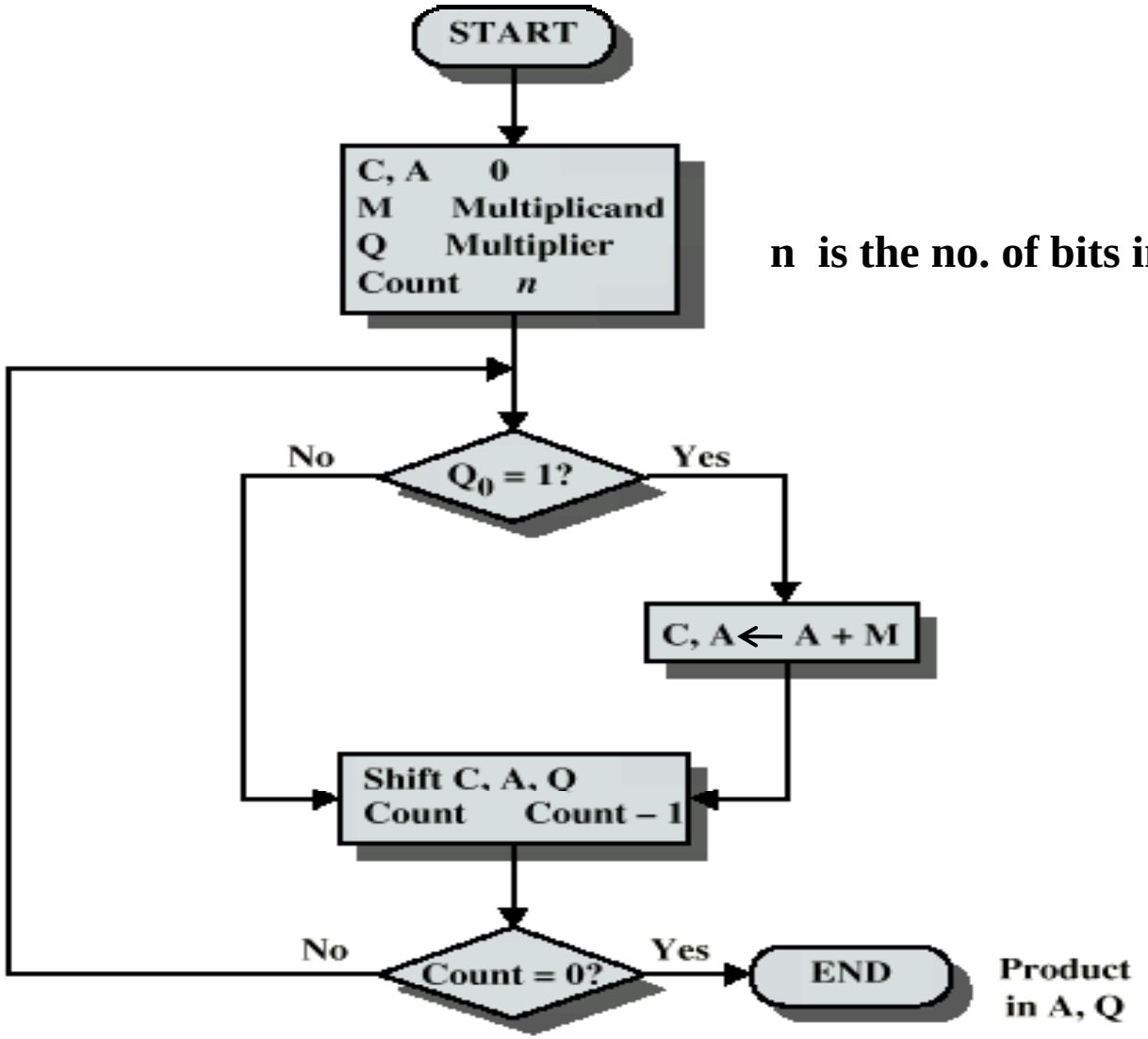
1. Restoring Division Method for Unsigned Numbers
2. Non-Restoring Division Method for Unsigned Numbers

2x2 - Bits Array Multiplier

$$
\begin{array}{cccc}
 & & b_1 & b_0 \\
 & \times & a_1 & a_0 \\
\hline
 & & a_0b_1 & a_0b_0 \\
+ & a_1b_1 & a_1b_0 & \\
\hline
c_3 & c_2 & c_1 & c_0
\end{array}
$$

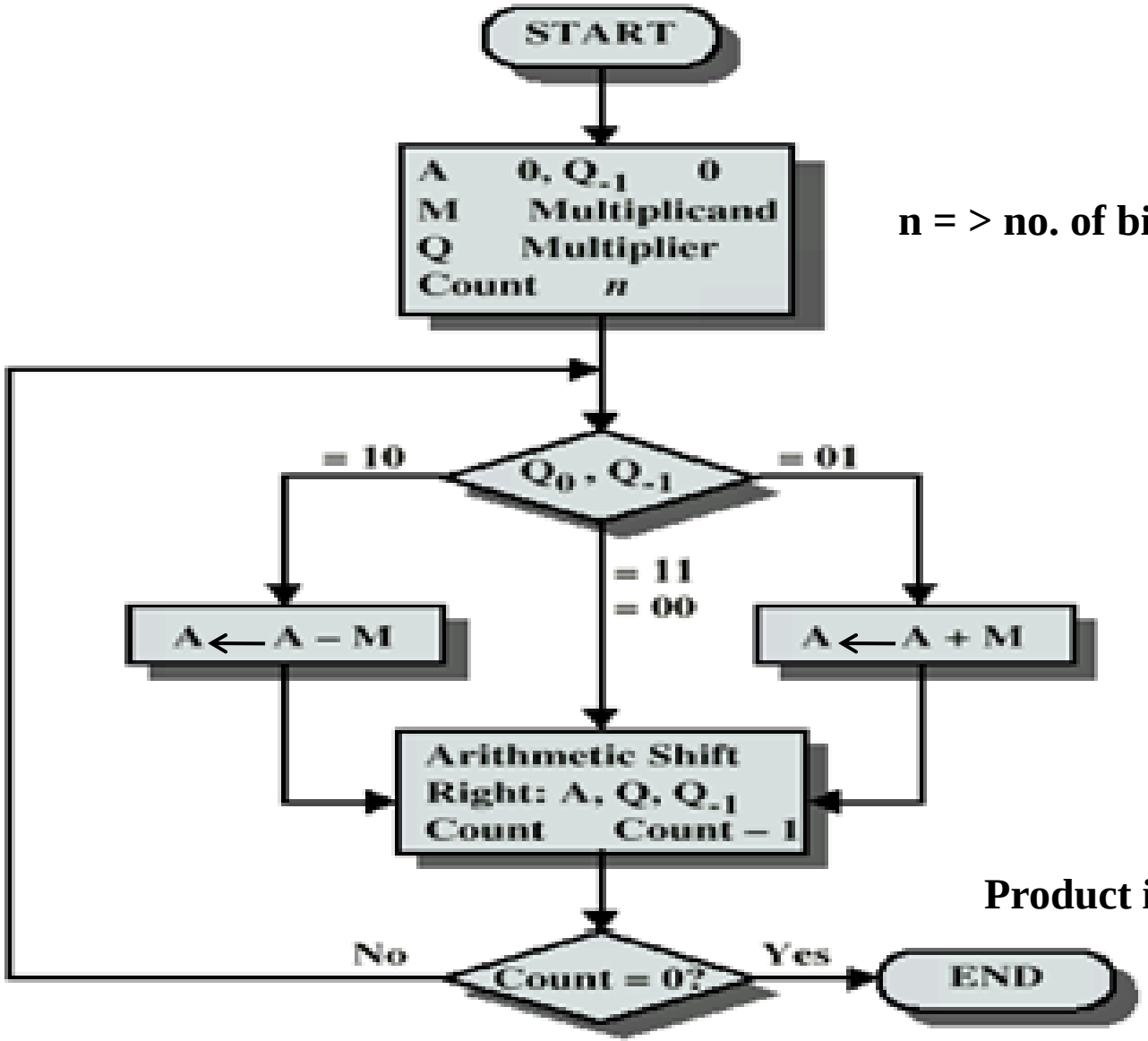


Sequential Multiplier



n is the no. of bits in Q

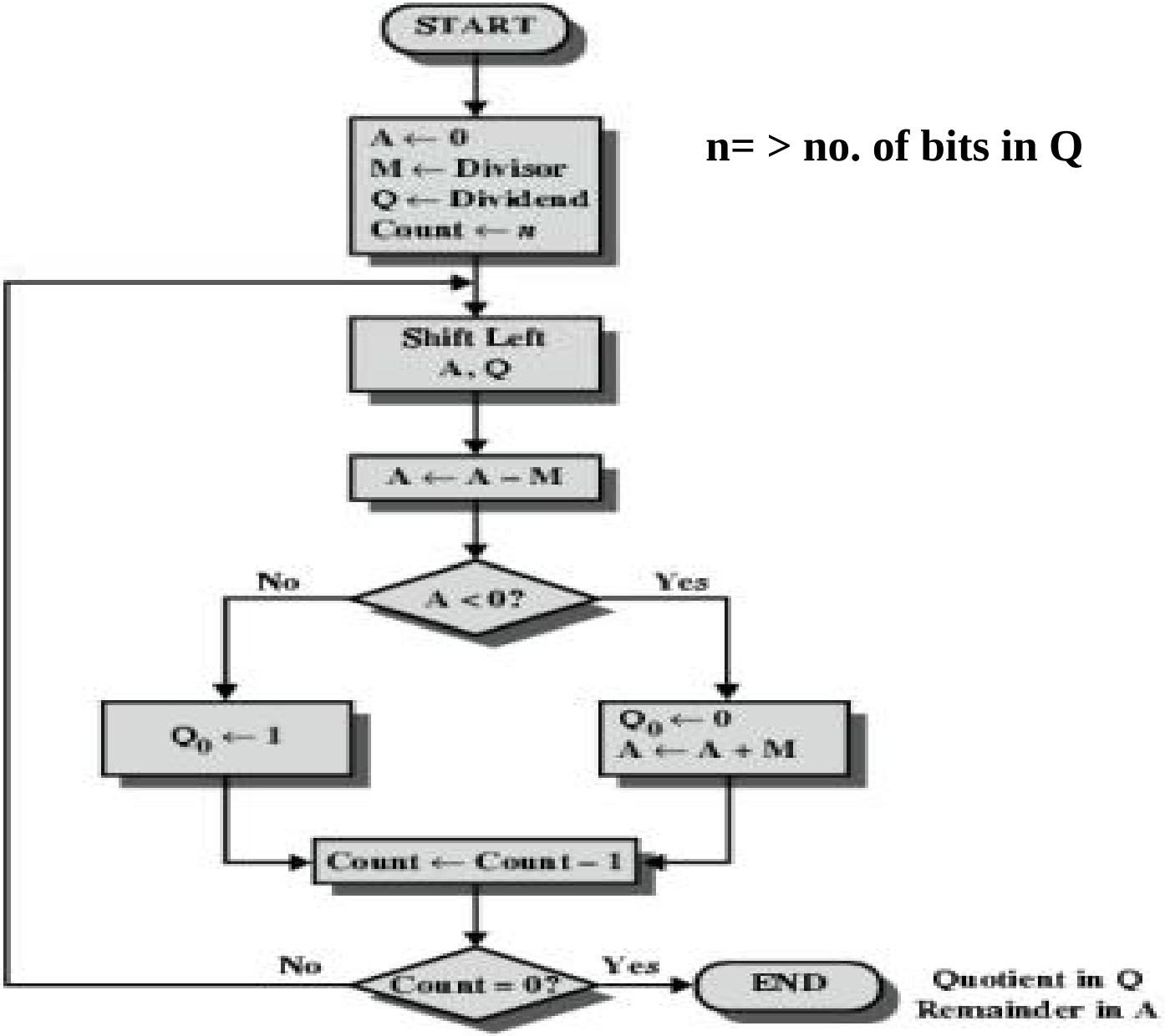
Booth's Multiplier



n = > no. of bits in Q

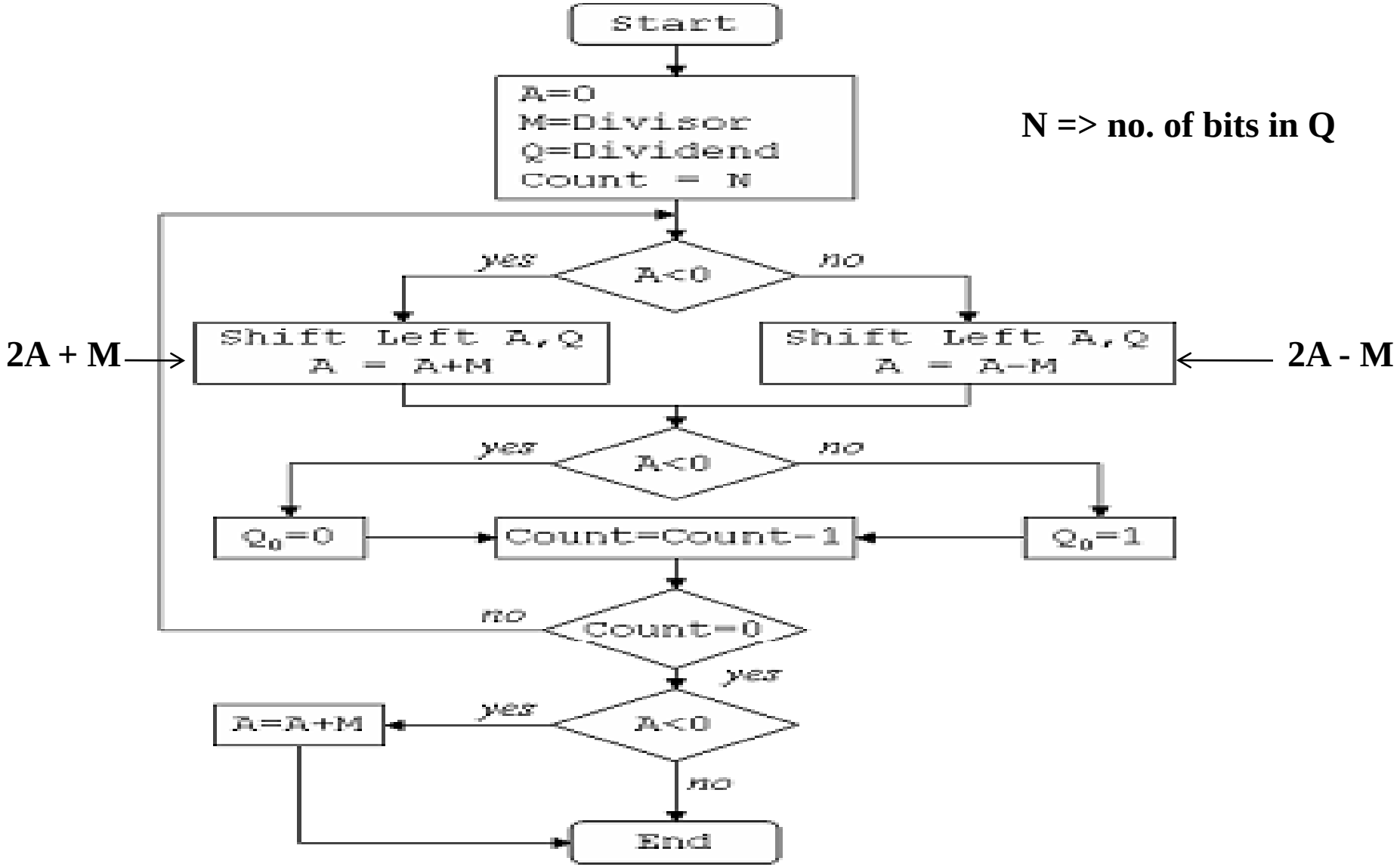
Product in AQ

Restoring Division Method



n= > no. of bits in Q

Non-Restoring Division Method




Q+A

1. Sequential multiplier is for signed nos.
   a) True b) False
2. Booth's multiplier is for signed nos.
   a) True b) False
3. Restoring division method is for signed nos.
   a) True b) False
4. Non-Restoring division method is for signed nos.
   a) True b) False
5. For restoring division method, restoring of A is equivalent to-
   a) A⟵ A b) A⟵ 2A c) A⟵ A + M d) A⟵ A - M
6. Left-shift of A is Equivalent to –
   a) A b) 2A c) A + M d) A – M
7. For non-restoring division ,there will be no restoring operation -
   a) True b) False
8. For Booth's multiplication , there will be no arithmetic operation when $\mathbf{Q_0Q_{-1}}$
   a) 00 & 10 b) 10 & 01 c) 00 & 11 d) 11 & 01

References

1. Computer Organization & Architecture – T. K. Ghosh
2. Computer System Architecture – M. Morris Mano