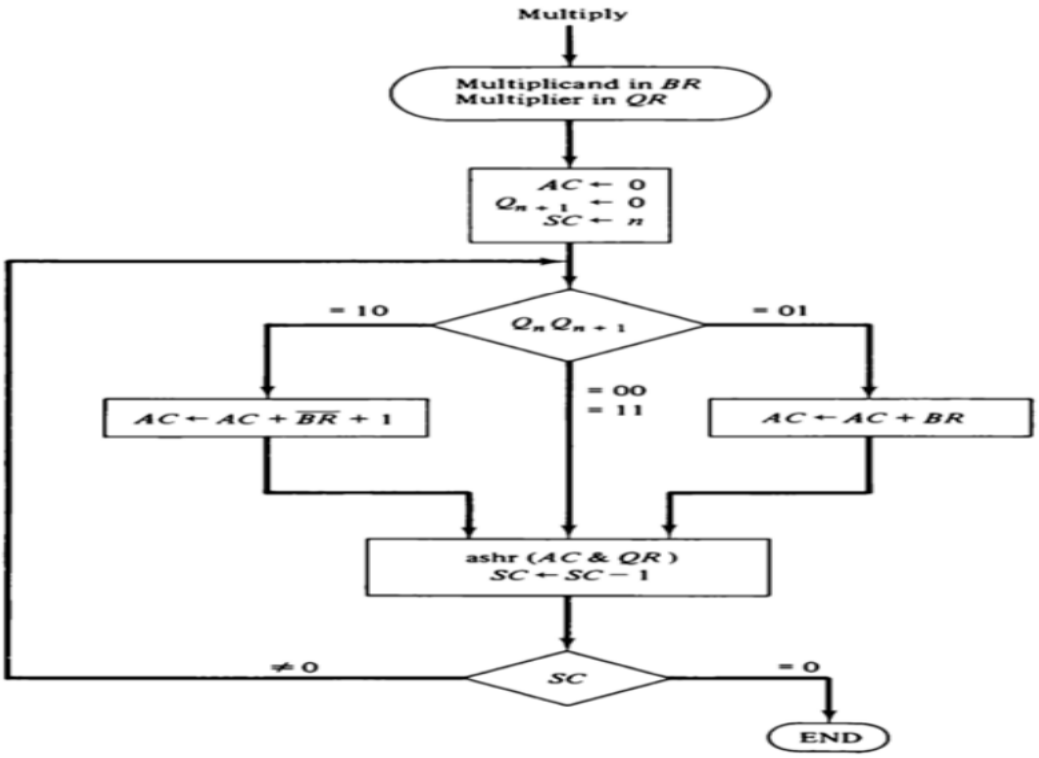
COMPUTER ORGANIZATION AND ARCHITECTURE
UNIT –III
TOPIC- BOOTH'S MULTIPLICATION ALGORITHM PART-2

Flowchart of Booth's algorithm



Flowchart of Booth's multiplication

EXAMPLE 1:

Example

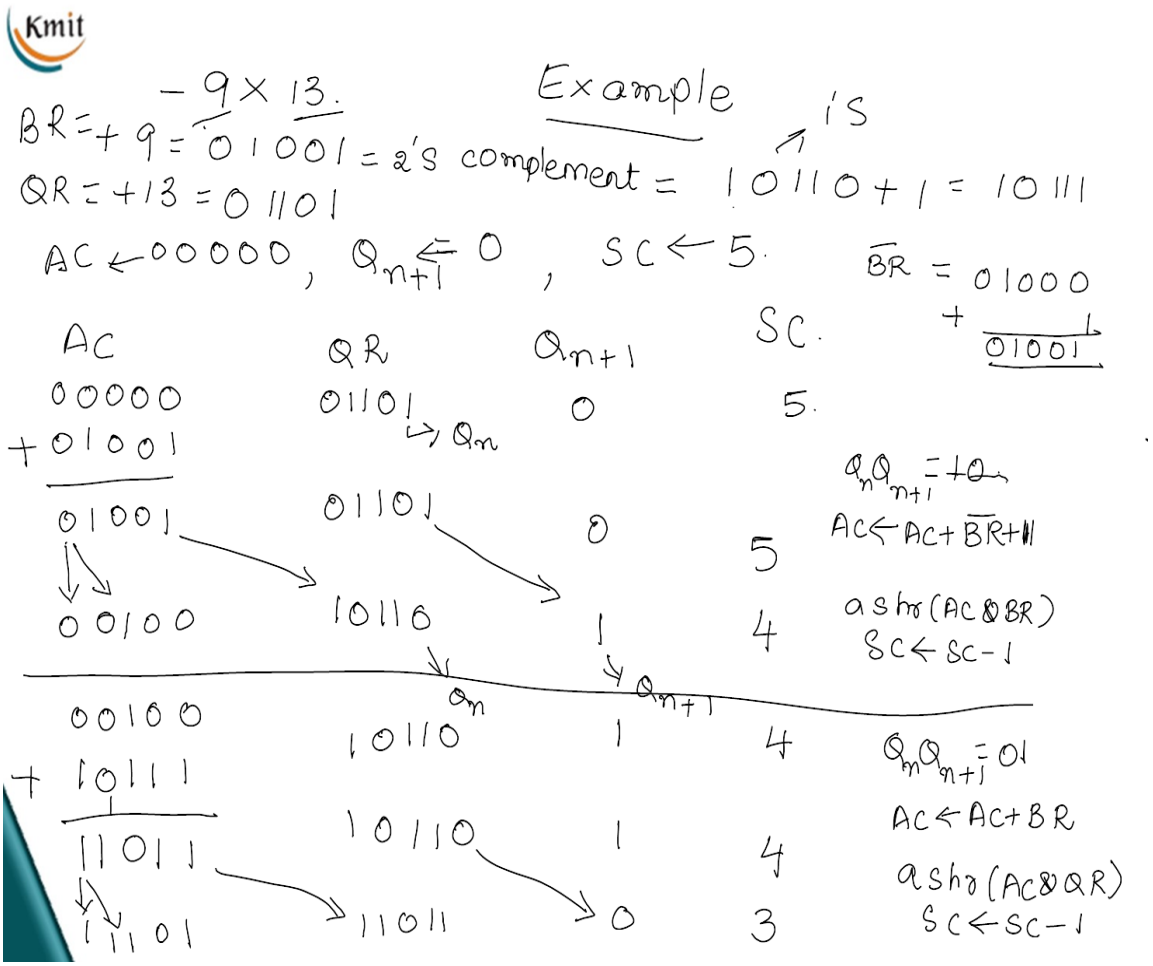
-9 X -13 = + 117

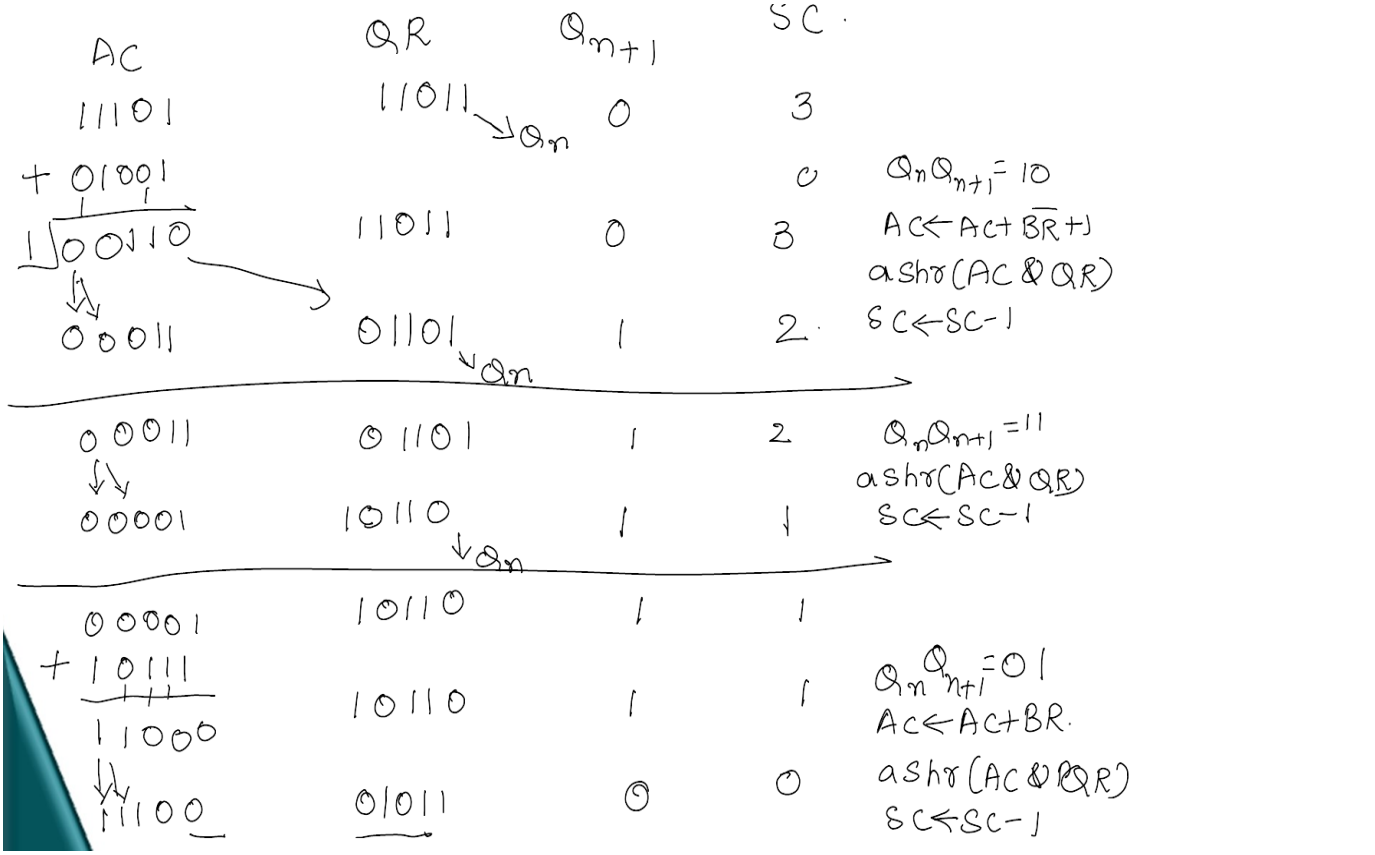
$Q_n\ Q_{n+1}$	BR = 10111 $\overline{BR}$ + 1 = 01001	AC	QR	Q_{n+1}	SC
	Initial	00000	10011	0	101
1 0	Subtract BR	01001			
		01001			
	ashr	00100	11001	1	100
1 1	ashr	00010	01100	1	011
0 1	Add BR	10111			
		11001			
	ashr	11100	10110	0	010
0 0	ashr	11110	01011	0	001
1 0	Subtract BR	01001			
		00111			
	ashr	00011	10101	1	000

Product= AC & QR= 0001110101=117

Since the msb bit of product is 0 , the sign of the product is positive= +117

EXAMPLE 2:


Example
-9 x 13.
BR = +9 = 01001 = 2's complement = 10110 + 1 = 10111
QR = +13 = 01101
AC ← 00000, Q_{n+1} ← 0, SC ← 5.
$\overline{BR}$ = 01000 + 1 = 01001
AC
QR
Q_{n+1}
SC.
00000
+01001
01101
Q_n
0
5.
Q_nQ_{n+1} = +0
AC ← AC + $\overline{BR}$ + 1
01001
01101
0
5
ashr (AC & BR)
SC ← SC - 1
00100
10110
1
4
Q_n
Q_{n+1}
00100
+10111
10110
1
4
Q_nQ_{n+1} = 01
AC ← AC + BR
11011
10110
1
4
ashr (AC & QR)
SC ← SC - 1
11101
11011
0
3



AC = 11100 QR = 01011 Q_{n+1} = 0 SC = 0

SC = 0 end.

→ msb = 1, is a negative no.

product = 1110001011

= 0001110100 ↓ +

0001110101 ⇒ −117.

Since the MSB bit of the product is 1, it indicates that the result is not the actual product. Perform the 2's complement of the product stored in AQ & QR to get the actual product.