

1.) Compute the Multiplication of (-14) and (-5) using Booth Algorithm

$-14 \Rightarrow$ 2's complement of 01110
1's complement is 10001

$$\therefore M = 10010$$

$$-M = 01110$$

$$\text{Multiplier}(Q) = -5$$

$$= 2's \text{ complement of } 00101$$

$$1's \text{ complement is } 11010$$

$$Q = 11011$$

Q1.) Continued

n	A	Q	q ₀	Steps
5	00000 01110	11011	0	Initialization q ₁ q ₀ = 10, A → A-M
4	01110 ↓ ↓ ↓ ↓ ↓ 00111	11011 ↓ ↓ ↓ ↓ ↓ 01101	0 1	ASR Aq ₀ , n → n-1 q ₁ q ₀ = 11, ASR Aq ₀ n → n-1
3	00011 10010	10110	1	q ₁ q ₀ = 01, A → A+M
2	10101 ↓ 11010 01110	10110 ↓ 11011	1 0	ASR, Aq ₀ , n → n-1 q ₁ q ₀ = 10, A → A-M
1	01000 ↓ 00100	11011 ↓ 01101	0	ASR Aq ₀ , n → n-1
0	00100	01101	0	q ₁ q ₀ = 11, ASR Aq ₀ n → n-1

$$AQ = 0001000110$$

$$= 1 \times 2^6 + 1 \times 2^2 + 1 \times 2^1$$

$$\therefore (-14) \times (-5) = 70 \text{ (Ans)}$$

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2.) 15×12

$15 \rightarrow 1111 (M)$

$12 \rightarrow 1100 (Q)$

n	C	A	Q	
1	0	0000	1100	
	0	0000	0110	ASR CAQ
2	0	0000	0011	ASR CAQ
3	0	1111	0011	$A = A + M$
4	0	0111	1001	ASR CAQ
	1	0110	1001	
	0	1011	0100	$A = A + M$
				ASR CAQ

(16+32+128)

+ 4

= 160 + 16 + 4

= 180 (Ans)

$15 \times 12 = 180$