

### Multiplication of Positive Numbers :

The simple way to multiply two positive binary number is shown in figure...

	$M_1$	$M_0$	
	1	1	Multiplicand (M)
	$Q_1$	$Q_0$	
	1	1	Multiplier (Q)
	1	1	
	1	*	Partial Products (PP)
1	0	0	1 Product (P)
$P_3$	$P_2$	$P_1$	$P_0$

Each bit of product is addition of partial product bits. Each bit of partial product is obtained by multiplying bits of multiplicand and multiplier. Each bit of partial product takes one cell, which internally consist of one full adder circuit to add the bits of PP to obtain the product bit and AND gate to multiply bits of multiplier and multiplicand.

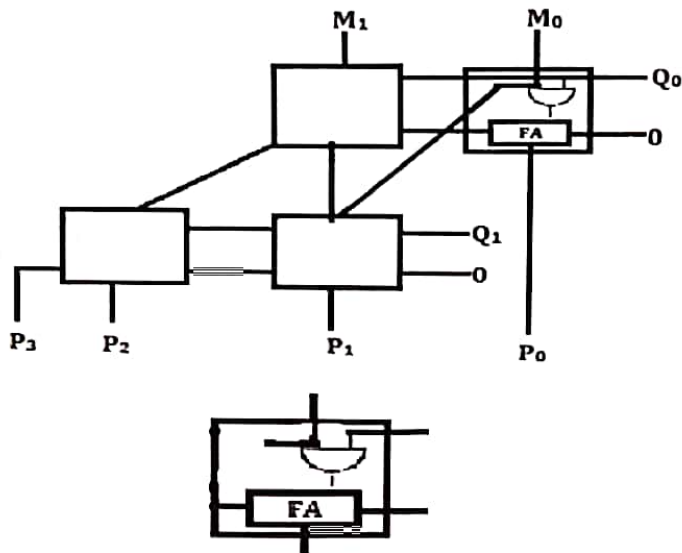


Figure 5.8: Array Multiplication of Positive Binary Operand.

### Binary Multiplication by using Sequential Circuit:

The circuit has three registers, register A, register M and register Q. Initial value of A is zero, register M is used to store multiplicand bits and Q is used to store bits of multiplier. In order to obtain the product, it takes n cycles, the value of n is depending upon the bits of multiplier. Each cycle performs two operations. In first step it shifts the content of register A and Q towards right side one bit. If the least significant bit is '0' the sequential controller instructs the adder circuit do not add the content of M to the register A, or else it adds the content of A to M

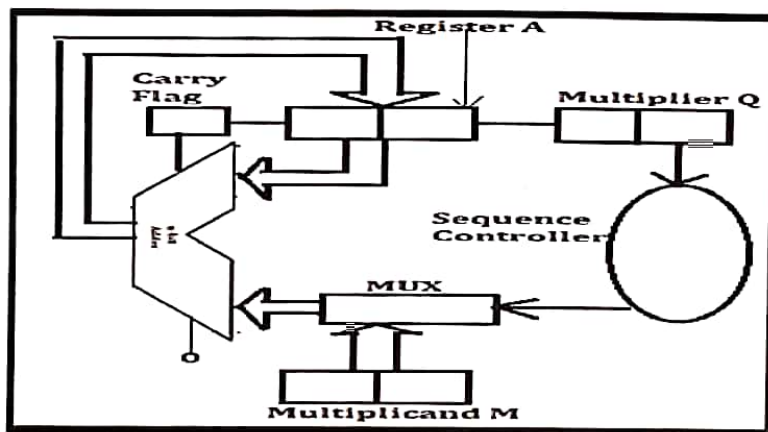
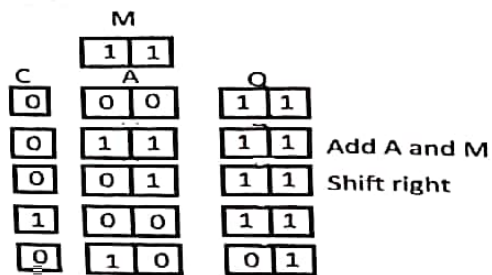


Figure 5.9: Sequential Circuit Binary Multiplier.

**Example:** Multiply two numbers by using sequence controller, the numbers are 3 and 3.



**Example:** Multiply two numbers by using sequence controller, the numbers are 3 and 5.

