## Full-Adder

A full-adder is a logic circuit having 3 inputs A,B and C ( which is the carry from the previous stage) and 2 outputs (Sum and Carry), which will perform according to table 3. The full-adder can handle three binary digits at a time and can therefore be used to add binary numbers in general.

The simplest way to construct a full adder is to connect two half- adder and an OR gate as shown in Fig 2-4. The full-adder is then the fundamental logic circuit incorporated in digital computers to perform arithmetic functions.
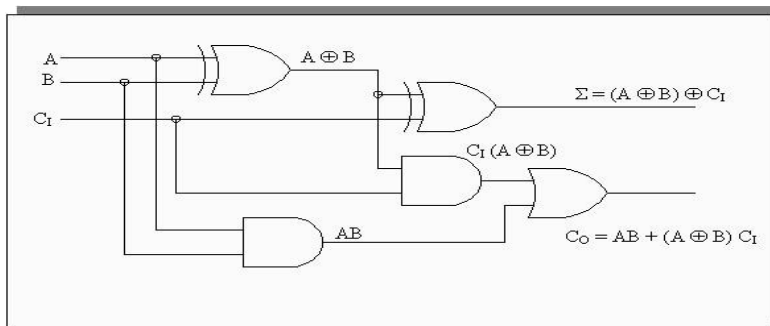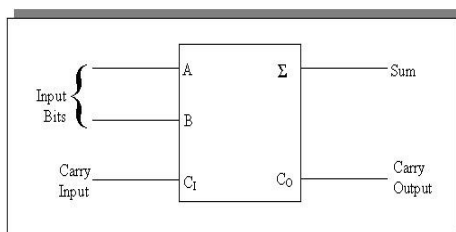


**Fig 2.4a**

**Fig 2.4b**

| input | | | output | |
|---|---|---|---|---|
| A | B | $C_I$ | $C_O$ | S |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

**Fig 2.4c**

**Table 3**



Fig 2.4c circuit diagram:

A ⊕ B between first and second full adder blocks.

First block: inputs A, B; outputs Σ, $C_O$. Input $C_I$.

Second block: inputs A, B; outputs $\Sigma = (A \oplus B) \oplus C_I$, $C_O$.

$(A \oplus B)\, C_I$

AB

$C_O = AB + (A \oplus B)\, C_I$