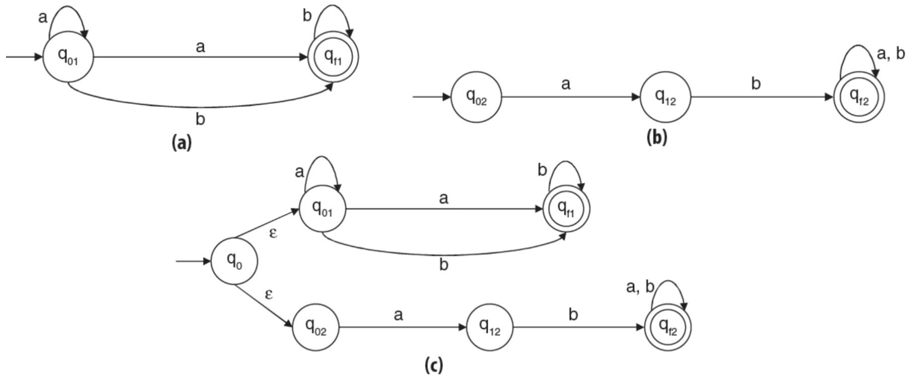


Fig.5.38(a)–(c)

3. The initial state of $M\prime$ is the same as the final state of M ($M\prime$ is the reverse direction of M)
4. The fi nal state of $M\prime$ is the same as the initial state of M ($M\prime$ is the reverse direction of M)

Let a string w belong to L, i.e., w $\varepsilon$ M. So,there is a path from $q_0$ to F with path value w. By reversing the edges, we get a path from F to $q_0$ (beginning and final state of $M\prime$) in $M\prime$. The path value is the reverse of w, i.e., $w^T$. So, $w^T \varepsilon\, M\prime$.

So, the reverse of the string w is regular.

**Example**:
Let $L = ab(a+b)^*$.

The FA M accepting L is as shown in Fig. 5.39$(a)$.
The reverse of the FA $M\prime$ accepting Lc is shown in Fig. 5.39$(b)$.

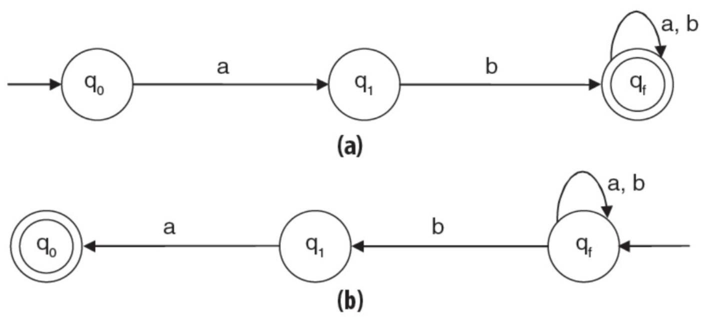


Fig.5.39(a)–(b)

$M\prime$ accepts $(a+b)^*ba$ which is reverse of L.

***Theorem 5.5***:If L is regular and L is a subset of $\Sigma^*$,prove that $\Sigma^*–L$ is also a regular set.

As L is regular,there must be an FA,$M = (Q, \Sigma, \delta, q_0, F)$,accepting L.Let us construct another DFA

$M\prime = (Q, \Sigma, \delta, q_0, F\prime)$ where $F\prime$ = Q–F. So, the two DFA differ only in their final states. A fi nal state of M
is a non-final state of $M\prime$ and vice versa.

Let us take a string w which is accepted by $M\prime$. So,$\delta(q_0, w) \varepsilon F\prime, i.e., \delta(q_0, w) \varepsilon (Q–F)$.