Construction of DFA

Type-02:

For strings starting with a particular substring

Step-01 - Decide the minimum number of states required in the DFA and draw them.

> **Rule:** All strings starting with 'n' length substring will require minimum (n+2) states in its DFA

Step-02 - Decide the strings for which you will construct the DFA.

Step-03 - Construct the DFA for the above decided strings.

Remember: Always go with the existing path. Create a new path only when you can't find a path to go with.

Step-04 - After drawing the DFA for the above decided strings, send the left possible combinations to the dead state not over the starting state.
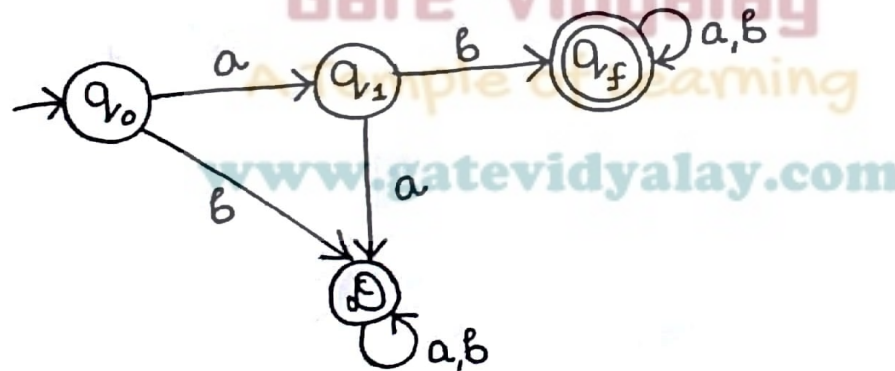
Question -

Draw the DFA for the language accepting strings starting with `ab` over input alphabet $\Sigma = \{a,b\}$

Solution -

Regular expression for the given language is-

$$ab(a+b)^*$$

Minimum number of states in the DFA = 4

Strings we will check
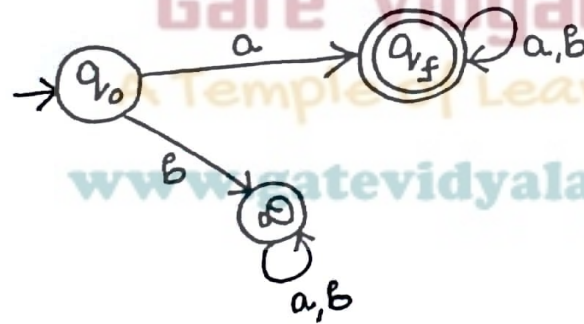- ab
- aba
- abab

Question-

Draw the DFA for the language accepting strings starting with `a` over input alphabets $\Sigma = \{a, b\}$

Solution-

Regular expression for the given language is-

$$a(a+b)^*$$

Minimum number of states in the DFA = 3
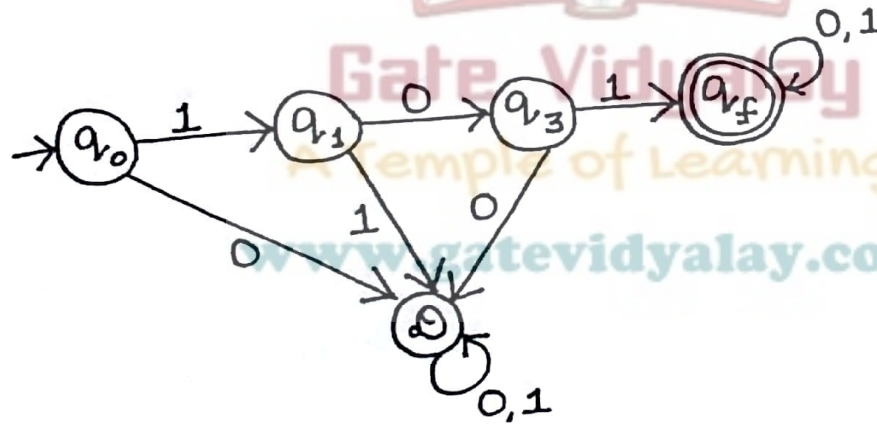

Strings we will check

- a
- aa

Question–

Draw the DFA for the language accepting strings starting with '101' over input alphabets $\Sigma = \{0,1\}$

Solution–

Regular expression for the given language is-

$$101(0+1)^*$$

Minimum number of states in the DFA = 5

Strings we will check
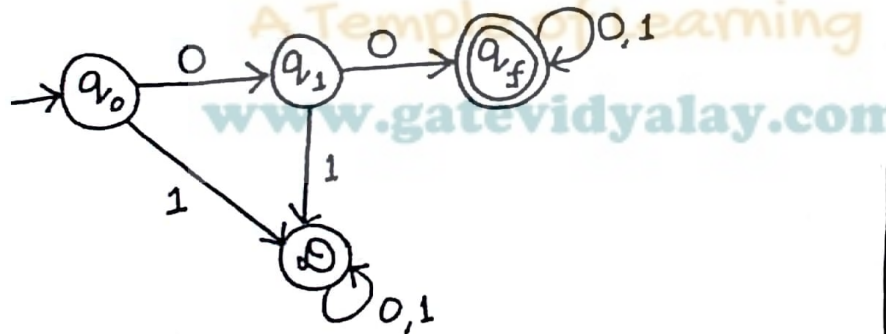
- 101
- 1011
- 10110
- 101101

Question-

Construct a DFA that accepts a language L over $\Sigma = \{0,1\}$ such that L is the set of all strings starting with '00'.

Solution-

Regular expression for the given language is-

$$00(0+1)^*$$

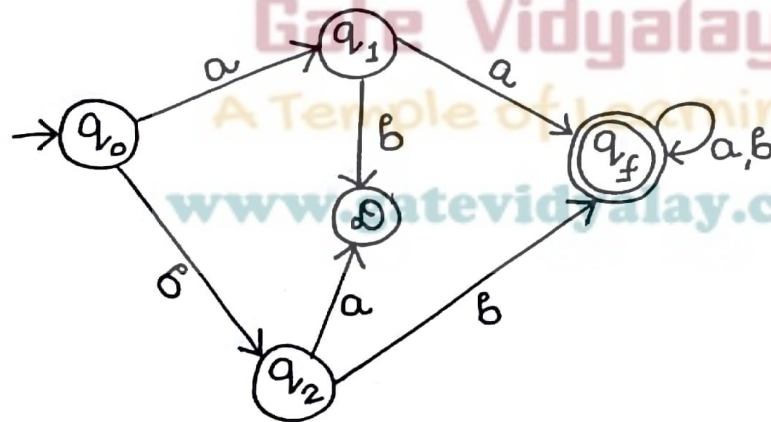Minimum number of states in the DFA = 4

Strings we will check

- 00
- 000
- 00000

Question-

Construct a DFA that accepts a language L over $\Sigma = \{a, b\}$ such that L is the set of all strings starting with 'aa' or 'bb'.

Solution-

Regular expression for the given language is-

$$(aa + bb)(a+b)^*$$

Strings we will check

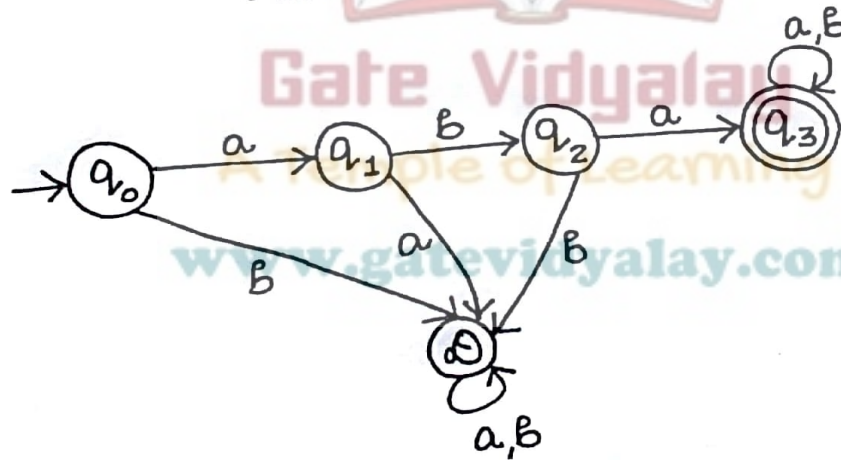- aa
- aaa
- aaaa

- bb
- bbb
- bbbb

Question-

Construct a DFA that accepts a language L over $\Sigma = \{a, b\}$ such that L is the set of all strings starting with 'aba'

Solution-

Regular expression for the given language is-

$$aba(a+b)^*$$

Minimum number of states in the DFA = 5

Strings we will check

- aba
- abaa
- abaab
- abaaba