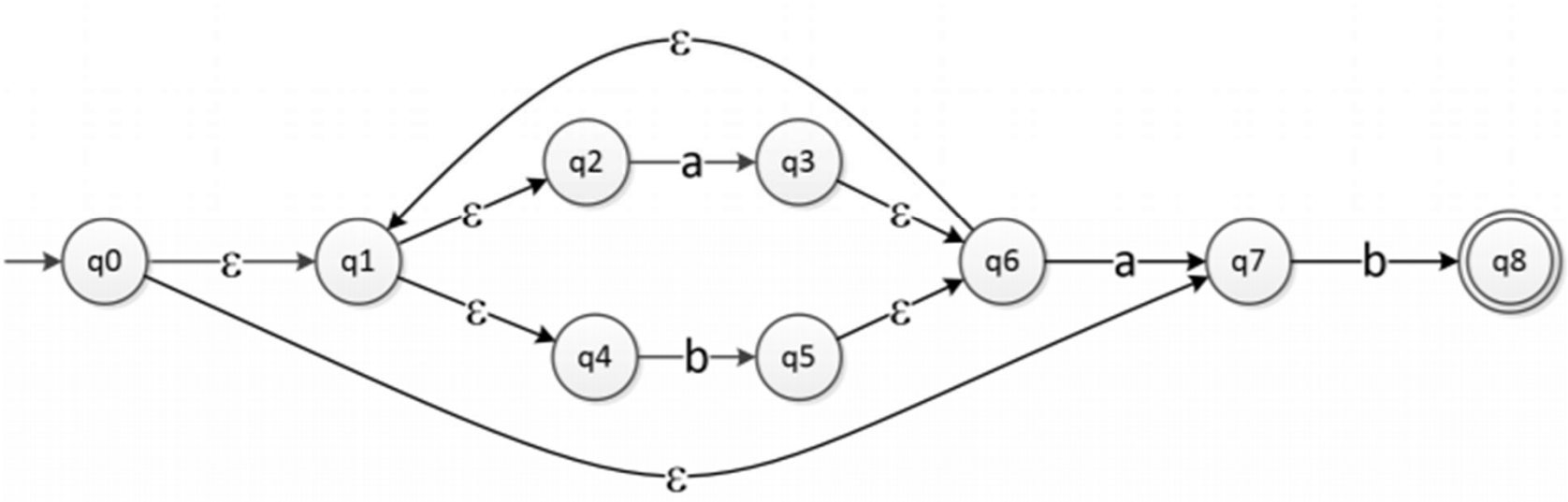
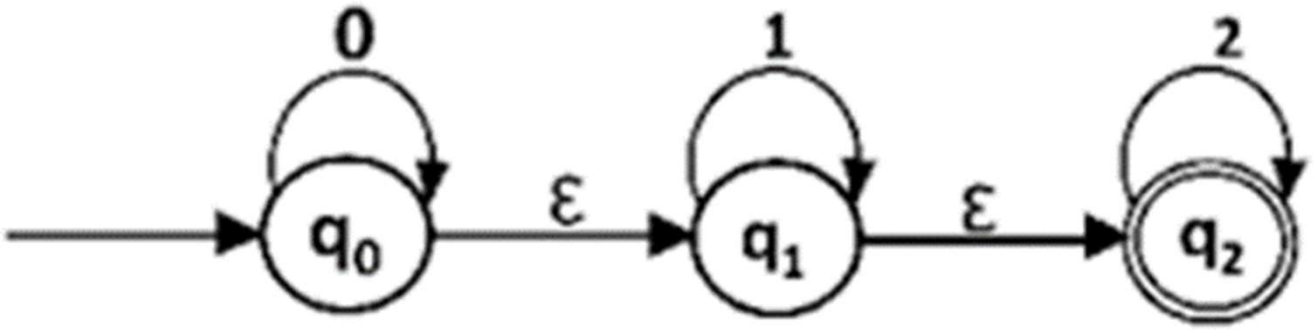
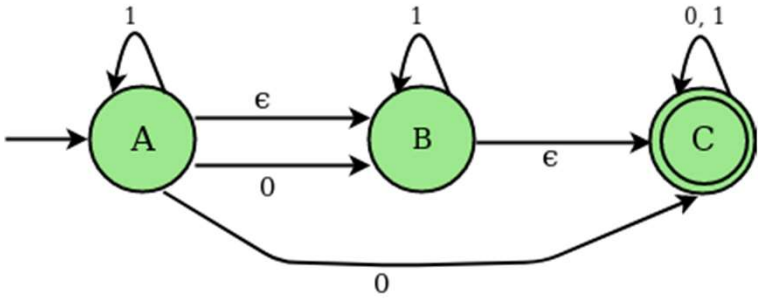
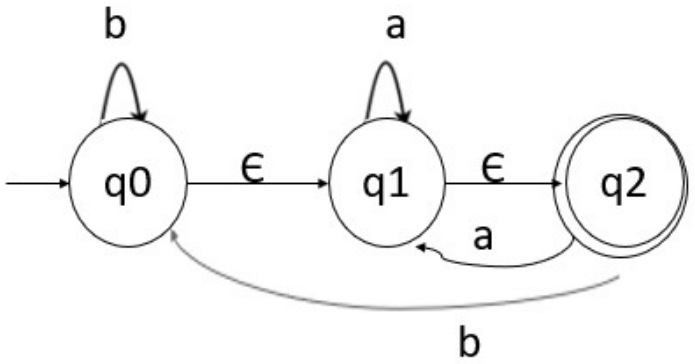
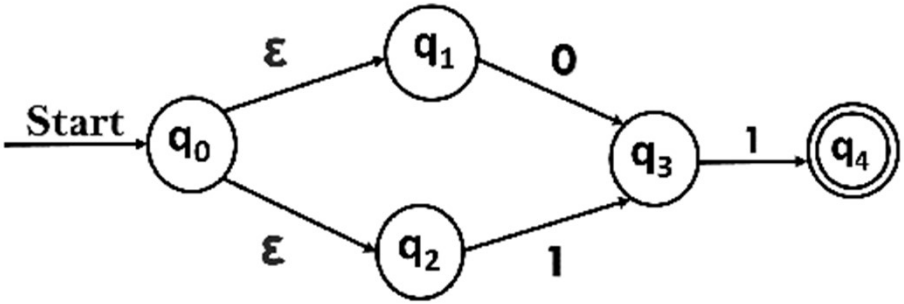
3. Convert the ϵ-NFA to a DFA.

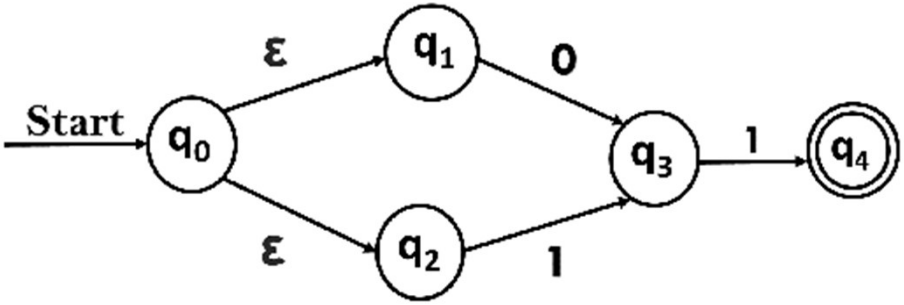


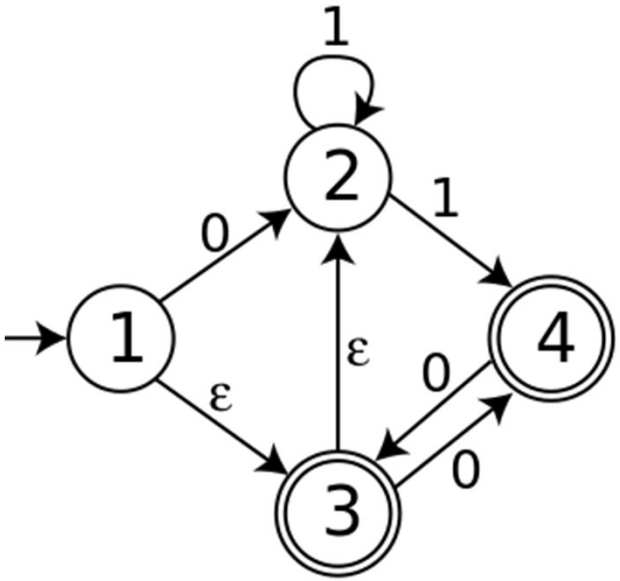

0
1
2
ε
ε
q_0
q_1
q_2

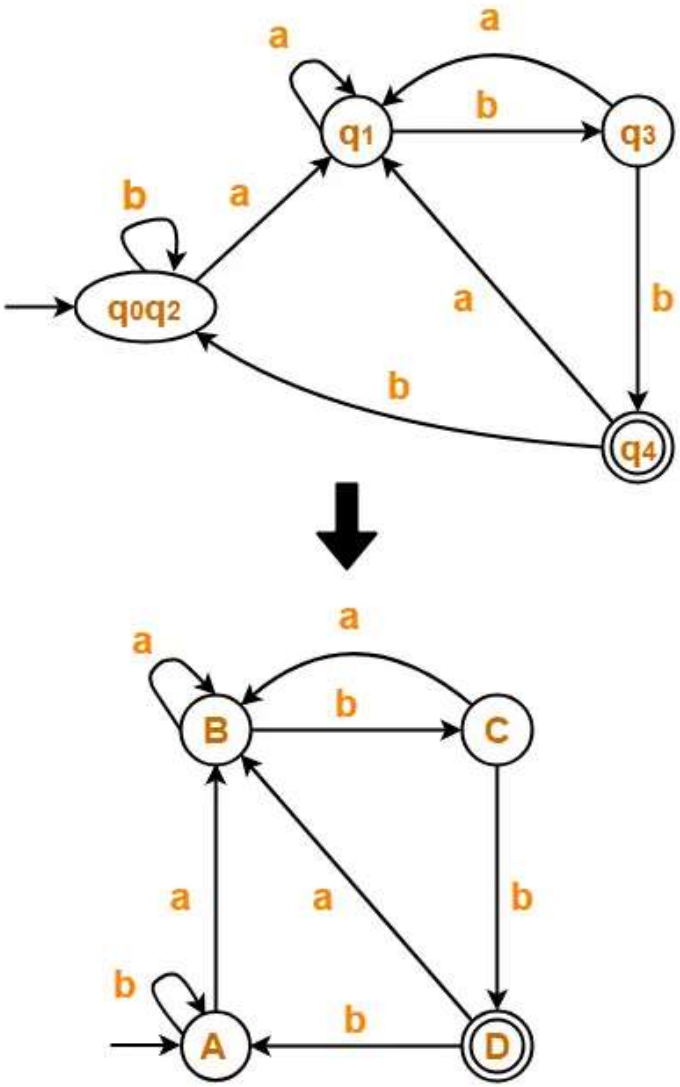

1
1
0, 1
A
B
C
ϵ
0
ϵ
0


b
a
q0
ϵ
q1
ϵ
q2
a
b

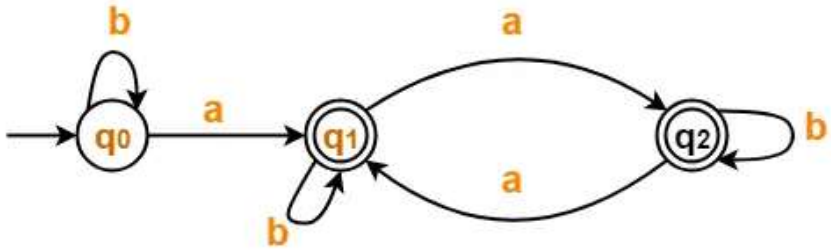

Start
q0
ε
q1
0
q3
1
q4
ε
q2
1

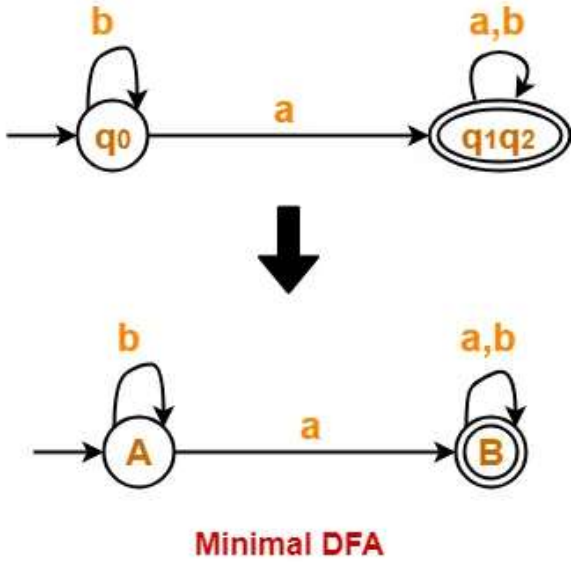

Start
q0
ε
q1
0
q3
1
q4
ε
q2
1


1
2
1
0
1
4
ε
ε
0
0
3

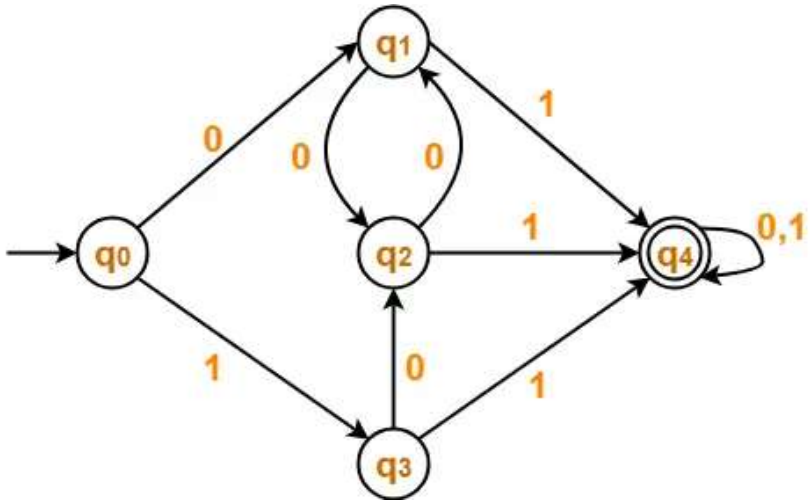


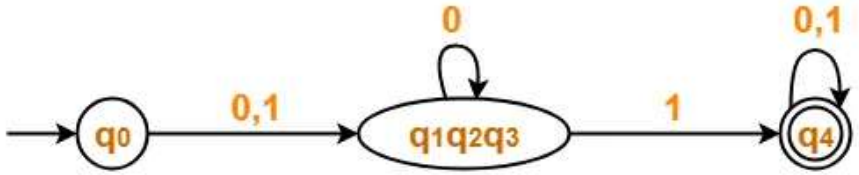
Minimal DFA

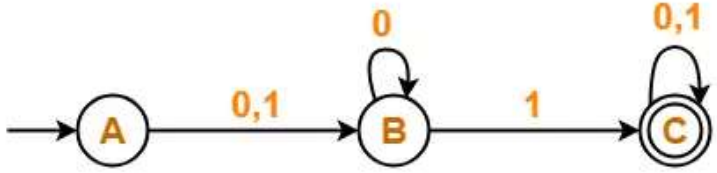




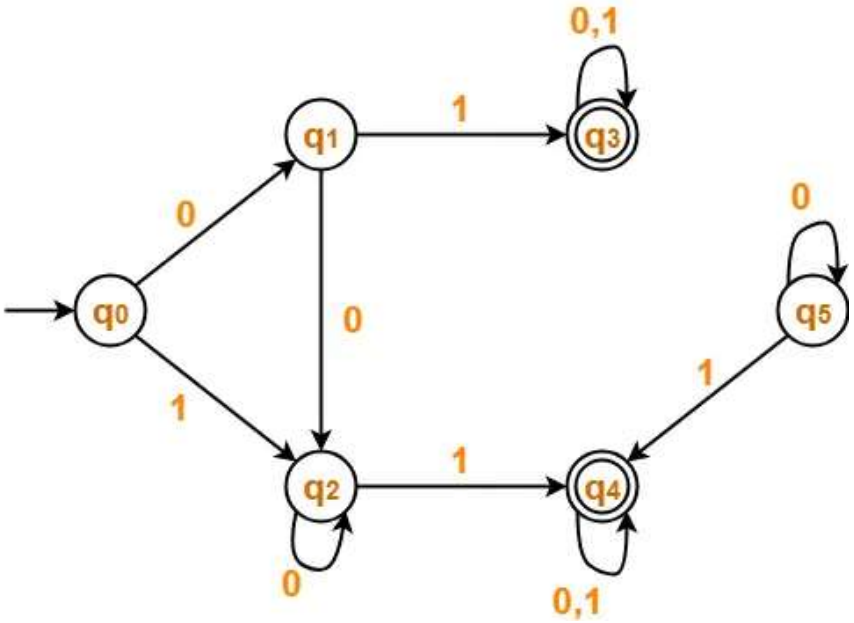
Minimal DFA

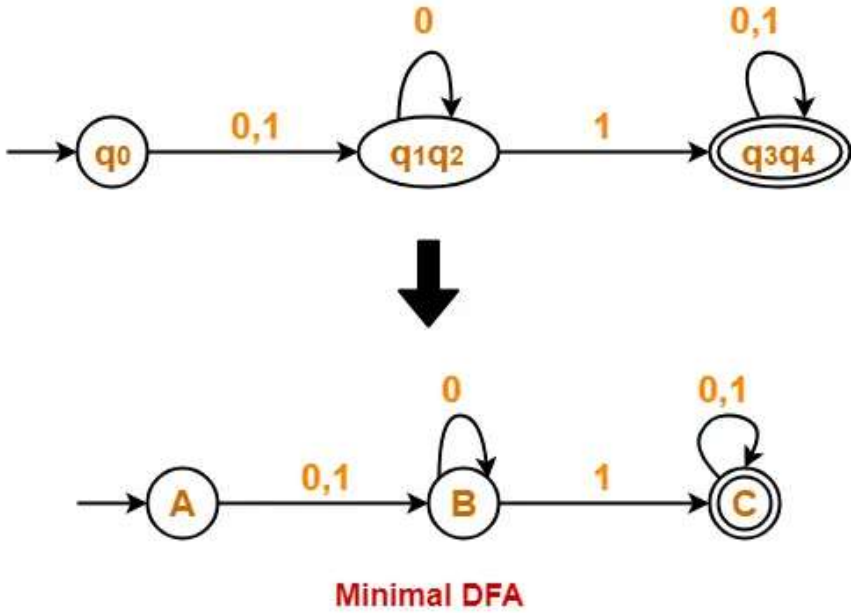




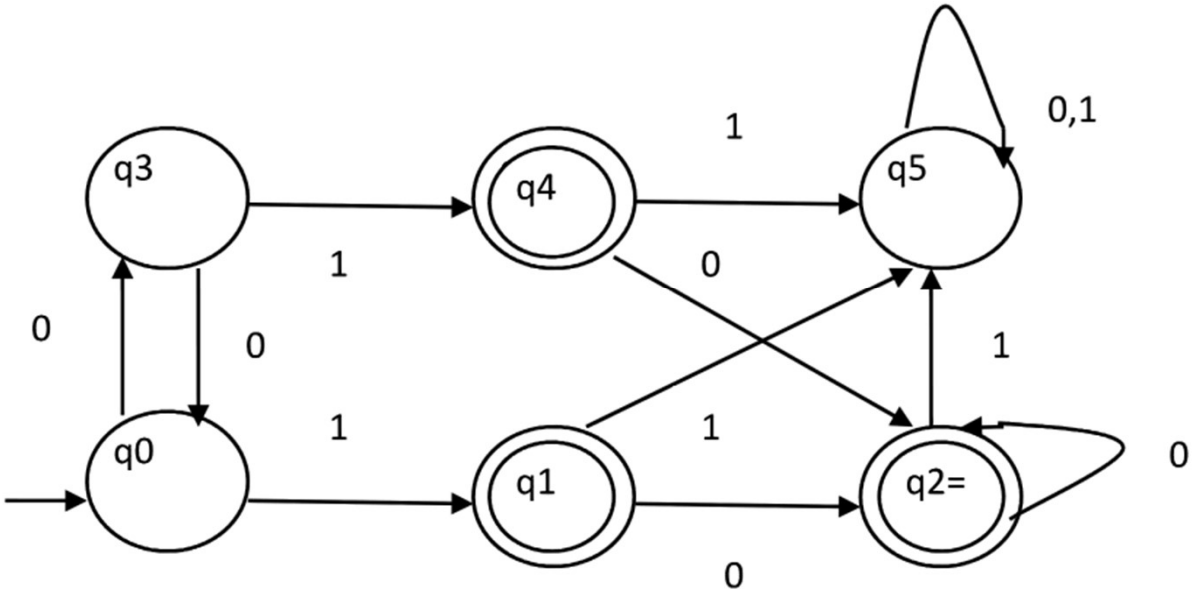


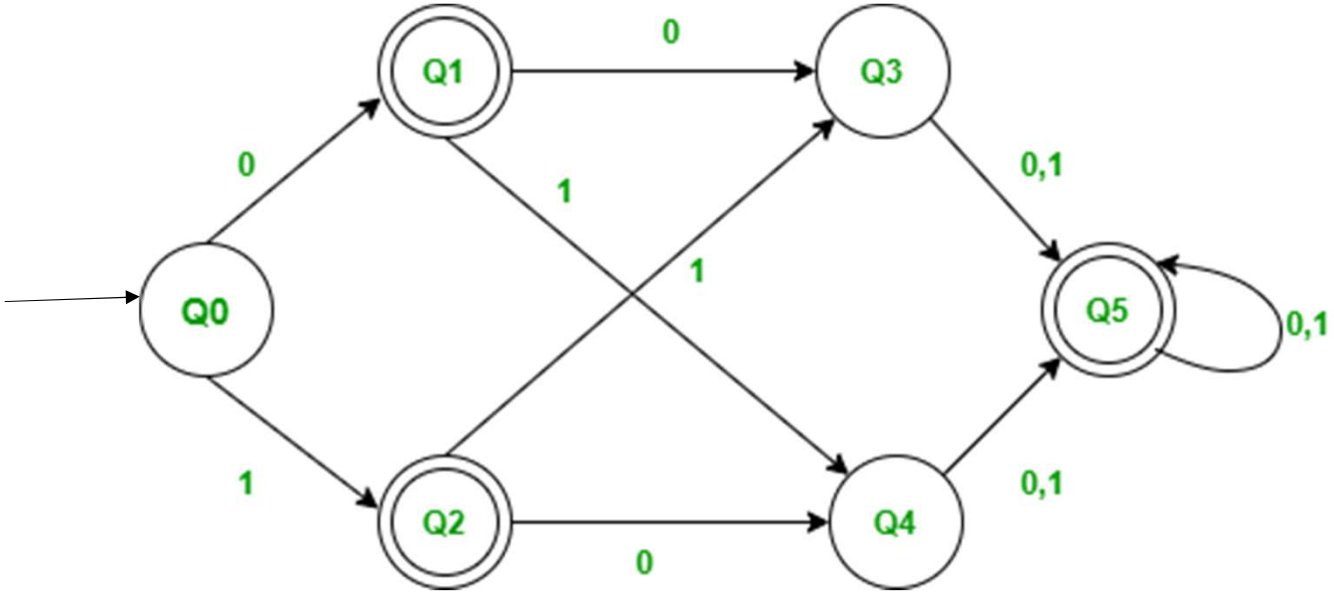
Minimal DFA





Minimal DFA

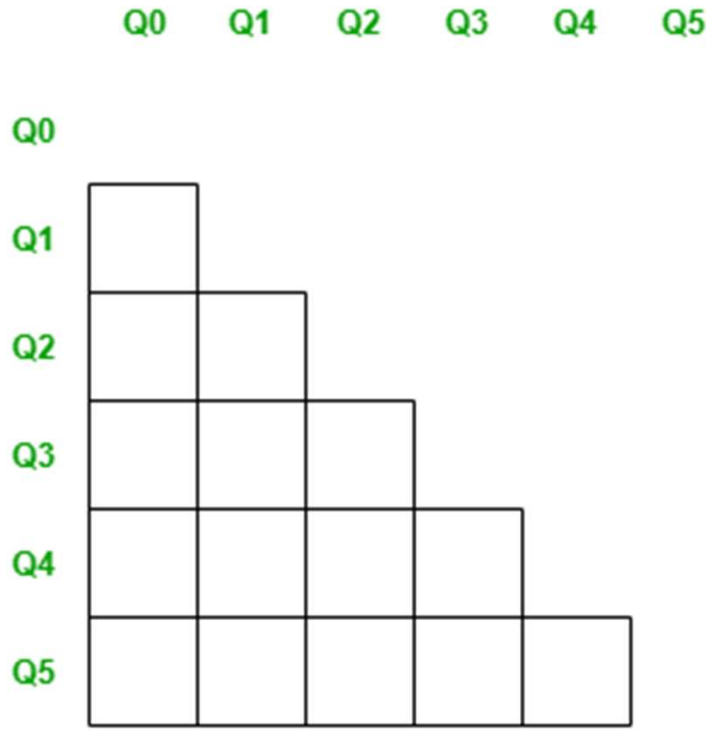

q3
q4
q5
q0
q1
q2=
0,1
1
1
0
0
1
1
0
0
1
0



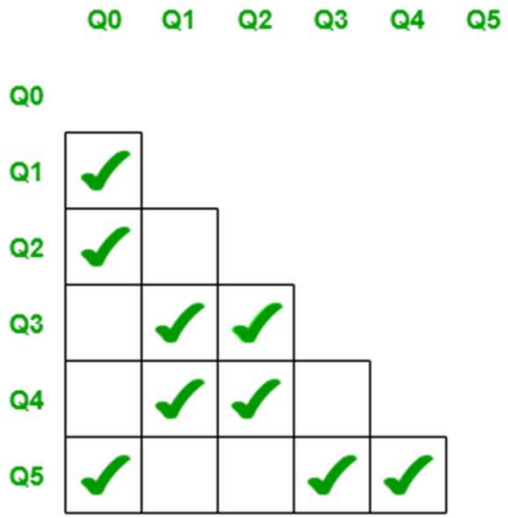
States	Inputs	
	0	1
Q0	Q1	Q2
Q1	Q3	Q4
Q2	Q4	Q3
Q3	Q5	Q5
Q4	Q5	Q5
Q5	Q5	Q5

Minimizing the above DFA :

Step-1: Create the pairs of all the states involved in DFA.



Step-2: Mark all the pairs (Qa,Qb) such a that Qa is Final state and Qb is Non-Final State.



Step-3: If there is any unmarked pair (Qa,Qb) such a that δ(Qa,x) and δ(Qb,x) is marked, then mark (Qa,Qb). Here x is a input symbol. Repeat this step until no more marking can be made.

•Check for the unmarked pair Q2,Q1

- Check when x=0 : δ(Q2,0) = Q4 and δ(Q1,0) = Q3, check if the pair Q4,Q3 is marked and no it is not marked.
- Check when x=1 : δ(Q2,1) = Q3 and δ(Q1,1) = Q4, check if the pair Q4,Q3 is marked and no it is not marked.
- Hence we cannot mark the pair Q2,Q1.

•Check for the unmarked pair Q3,Q0

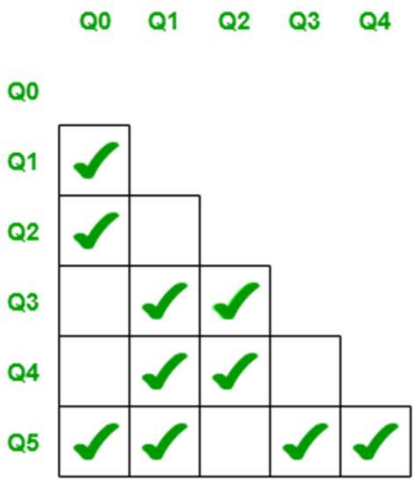
- Check when x=0 : δ(Q3,0) = Q5 and δ(Q0,0) = Q1, check if the pair Q5,Q1 is marked and no it is not marked.
- Check when x=1 : δ(Q3,1) = Q5 and δ(Q0,1) = Q2, check if the pair Q5,Q2 is marked and no it is not marked.
- Hence we cannot mark the pair Q3,Q0.

•Check for the unmarked pair Q4,Q0

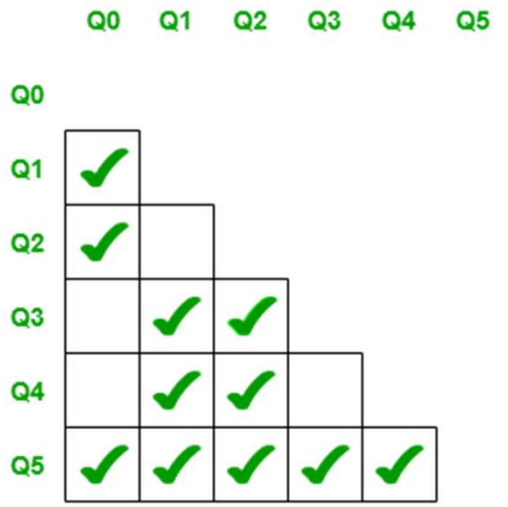
- Check when x=0 : δ(Q4,0) = Q5 and δ(Q0,0) = Q1, check if the pair Q5,Q1 is marked and no it is not marked.
- Check when x=1 : δ(Q4,1) = Q5 and δ(Q0,1) = Q2, check if the pair Q5,Q2 is marked and no it is not marked.
- Hence we cannot mark the pair Q4,Q0.

•Check for the unmarked pair Q4,Q3
- Check when x=0 : δ(Q4,0) = Q5 and δ(Q3,0) = Q5, Such pair of state Q5,Q5 don't exists.
- Check when x=1 : δ(Q4,1) = Q5 and δ(Q3,1) = Q5, Such pair of state Q5,Q5 don't exists.
- Hence we cannot mark the pair Q4,Q3.

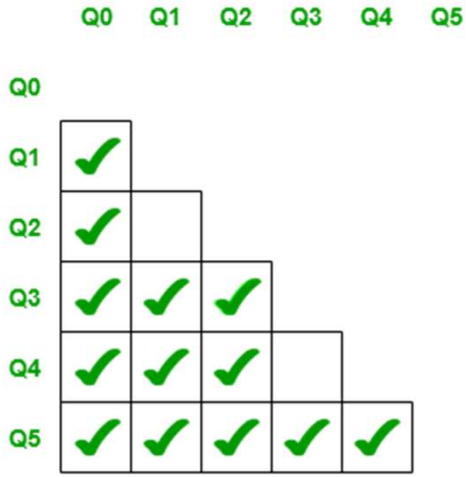
•Check for the unmarked pair Q5,Q1
- Check when x=0 : δ(Q5,0) = Q5 and δ(Q1,0) = Q3, check if the pair Q5,Q3 is marked and yes it is marked.
- Hence we can mark the pair Q5,Q1.



•Check for the unmarked pair Q5,Q2
- •Check when x=0 : δ(Q5,0) = Q5 and δ(Q2,0) = Q4, check if the pair Q5,Q4 is marked and yes it is marked.
- •Hence we can mark the pair Q5,Q2



- We have checked for all the unmarked pairs but don't need to stop here we need to continue this process until no more markir
- Check for the unmarked pair Q2,Q1
    - Check when x=0 : δ(Q2,0) = Q4 and δ(Q1,0) = Q3, check if the pair Q4,Q3 is marked and no it is not marked.
    - Check when x=1 : δ(Q2,1) = Q3 and δ(Q1,1) = Q4, check if the pair Q4,Q3 is marked and no it is not marked.
    - Hence we cannot mark the pair Q2,Q1.
- Check for the unmarked pair Q3,Q0
    - Check when x=0 : δ(Q3,0) = Q5 and δ(Q0,0) = Q1, check if the pair Q5,Q1 is marked and yes it is marked.
    - Hence we can mark the pair Q3,Q0.



States	Inputs	
	0	1
Q0	Q1Q2	Q1Q2
Q1Q2	Q3Q4	Q3Q4
Q3Q4	Q5	Q5
Q5	Q5	Q5