① .

$$R.E = R_{11}^{(2)} + R_{12}^{(2)} = \text{Final answer.}$$

(1). $\longrightarrow \boxed{q_0}$ $\Rightarrow RE = \epsilon$

(2). $\longrightarrow \boxed{q_0} \cdot \boxed{q_1}$ $\Rightarrow RE = \phi$

(3). $\longrightarrow \boxed{q_0} \xrightarrow{a} \boxed{q_1}$ $\Rightarrow R.E = a$

(4). $\longrightarrow \boxed{q_0} \xrightarrow{a} \boxed{q_1} \xrightarrow{b} \boxed{q_2}$ $\Rightarrow R.E = a.b$

5).

$\longrightarrow \boxed{q_0} \xrightarrow{a,b} \boxed{q_1}$ $RE = a+b$

$\longrightarrow \boxed{q_0} \overset{a}{\underset{b}{\rightleftarrows}} \boxed{q_1}$ $R.E = a+b$

6). $\longrightarrow \boxed{q_0} \xrightarrow{a} \boxed{q_1} \circlearrowright b$ $R.E = ab^*$

(7). $\longrightarrow \boxed{q_1} \circlearrowright a,b$ $\Rightarrow R.E = (a+b)^*$

(8). $\longrightarrow \boxed{q_0} \xrightarrow{a} \boxed{q_1} \xrightarrow{b} \boxed{q_2}$, with b arc $R.E = ab+a$

(9). $\longrightarrow \boxed{q_0} \xrightarrow{a} \boxed{q_1} \xrightarrow{a} \boxed{q_2}$, with b loop $R.E = ab^*a$
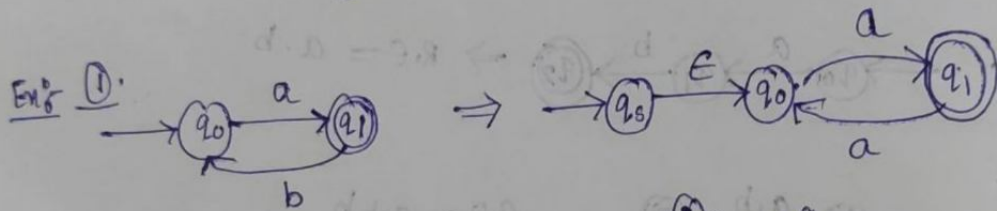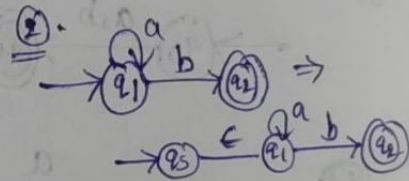
Construct R.E using finite automata using state
elimination.

procedure :-

step 1 :- Initial state of finite automata must not
have any incomming edge.

(i). If there is any incoming edge to initial
state then create new initial state having
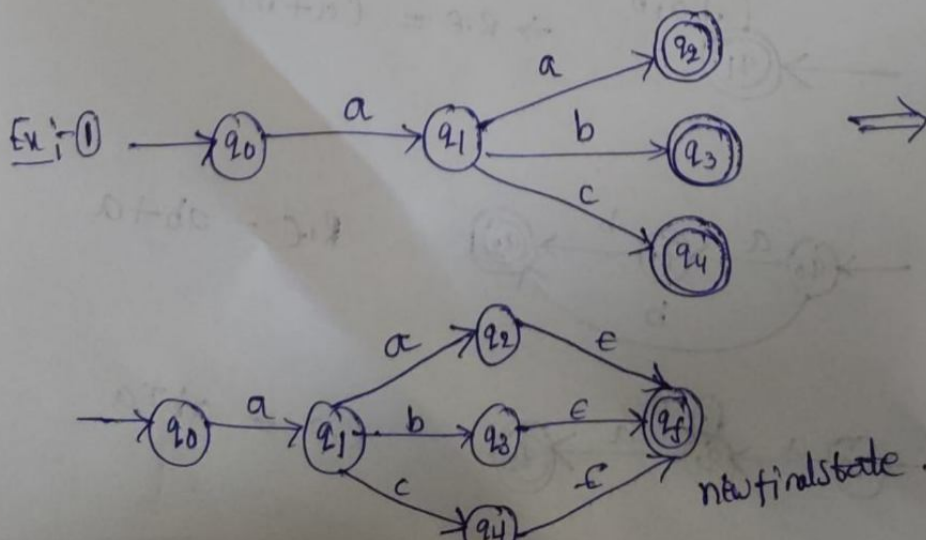no incoming edge to it.
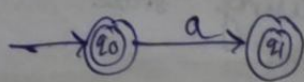
Ex: ①.

Here q_0 having
incomming edge

②.

step 2 :-

There must exist only one final state in DFA
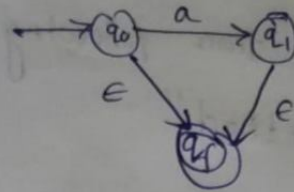If there exists multiple final states in the DFA. Then
convert all final states to non-final states and
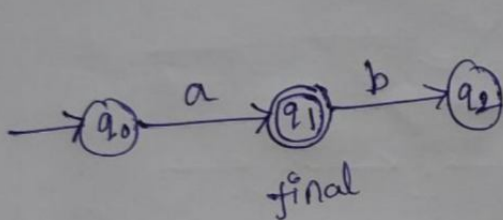then create new single final state
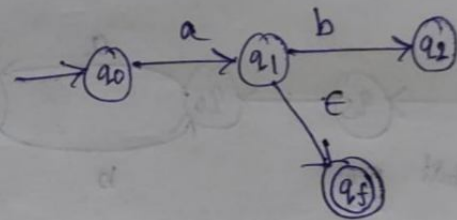
Ex: ①

new final state.

(2)

Step3:- Final state of DFA must not have any outgoing edge.

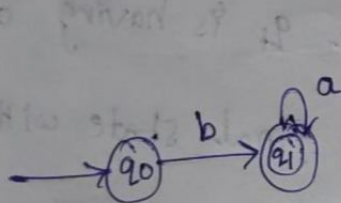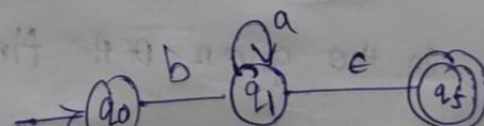If there exists any outgoing edge then create a new final state having no outgoing edge.
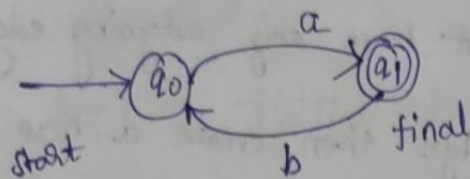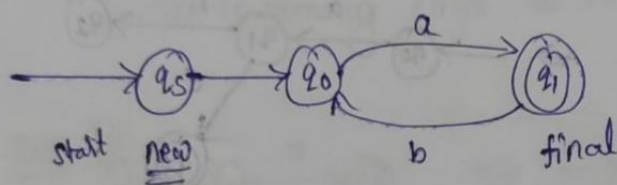
Ex:-

final

(A)

Step 4:- Eliminate all the intermediate states one by one.

These states are eliminated in any order.

3

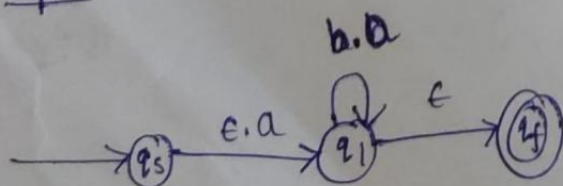(1). Construct R.E from following DFA using "state elimination method."

start

final

step 1:- given DFA start state q_0 having incomming edge, then create a new state with no incomming edge.

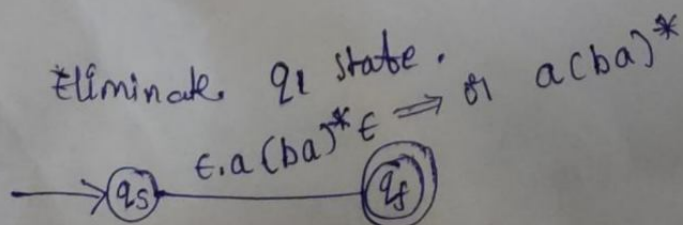start   new   b   final

step 2:- In the given DFA final state q_f is having an outgoing edge the create a new final state with no outgoing edge.
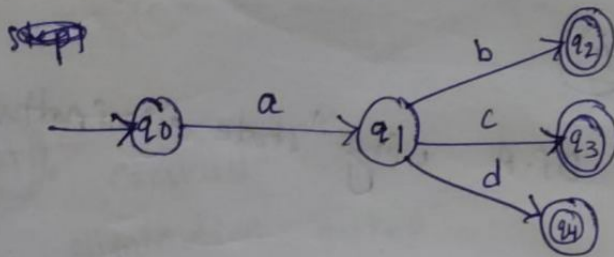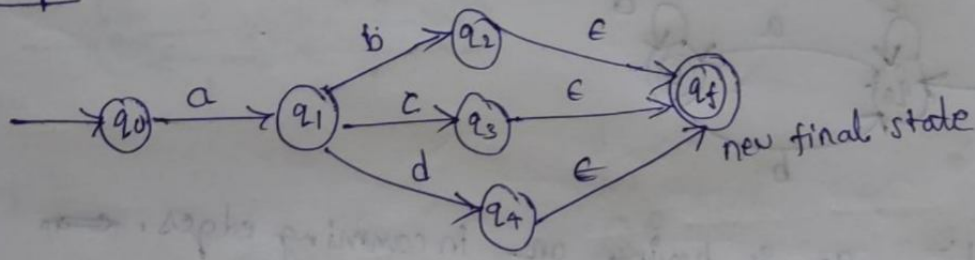

start   b   new final
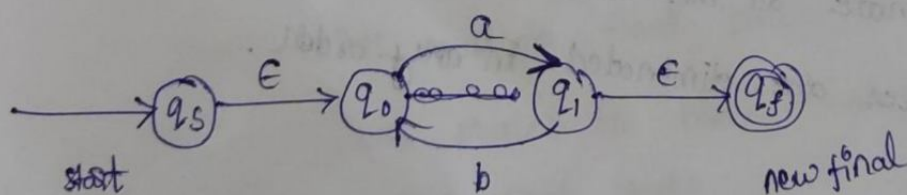
step 3:- Eliminate q_0 state.

b.a

$\epsilon.a$

step 4: Eliminate q_1 state.

$\epsilon.a(ba)^*\epsilon \Rightarrow$ or $a(ba)^*$

(2). Construct R.E from following DFA using state "state elimination method".

step9

Step1 :-

new final state
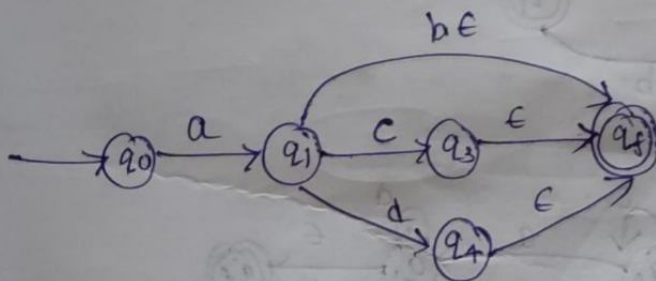
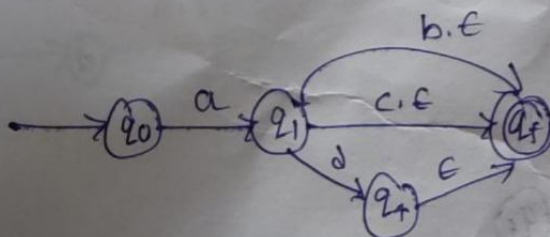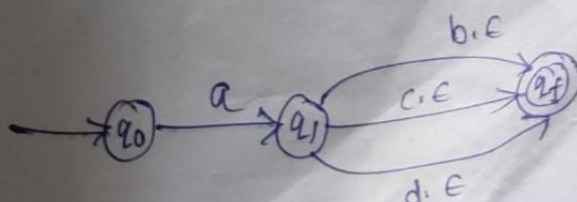step2 :-

eliminate state 'q₂'

eliminate state 'q₃'

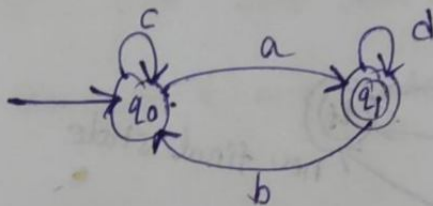

eliminate state 'q₄'

5

eliminate q_4

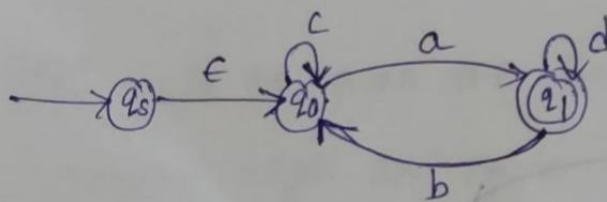$$\xrightarrow{} q_0 \xrightarrow{a \cdot (b+c+d)} q_f$$
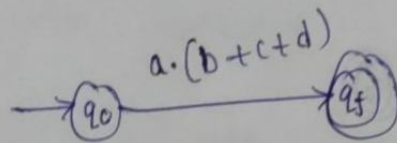
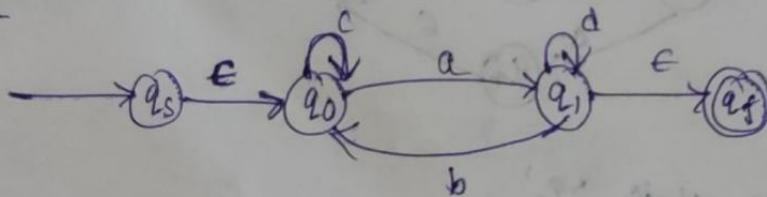(3) Construct R.E from D.F.A using "state elimination method".

Step 1:- q_0 is having an incomming edges.

Now create a new state.

Step 2:-
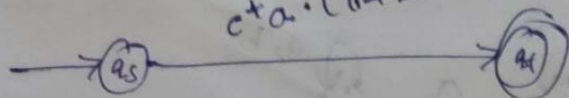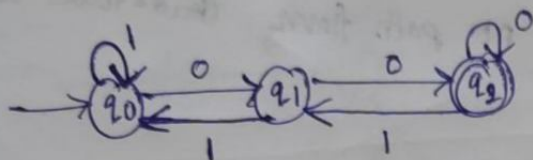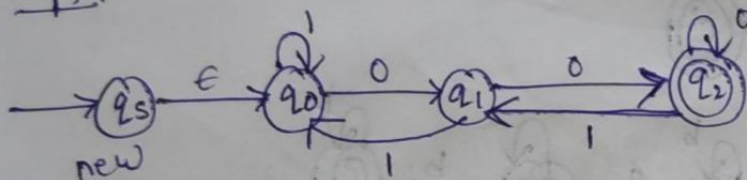

Step 3: Eliminate q_0.

$$\xrightarrow{} q_s \xrightarrow{\epsilon.c^*a} q_1 \xrightarrow{\epsilon} q_f$$

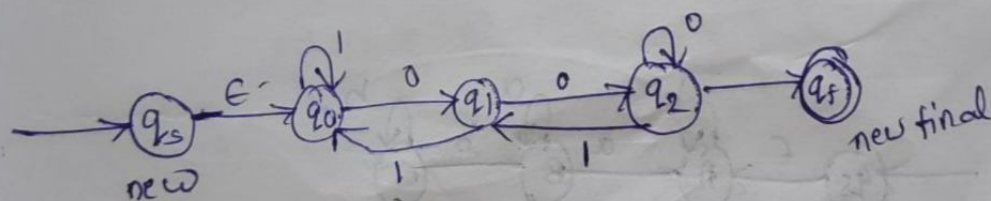with $(d+bc^*a)$ self loop on q_1

6

$$c^*a \cdot (d + bc^*a)$$

(4). Construct the R.E from D.f.A using "state elimination method".

step1:-

new

Step2:-

new   new final

step3:- eliminate q_0

$$1 \cdot 1^* 0$$

$$\epsilon \cdot 1$$
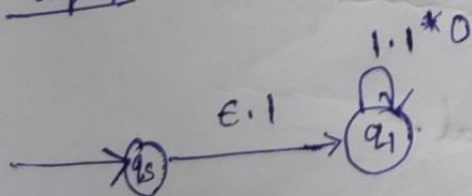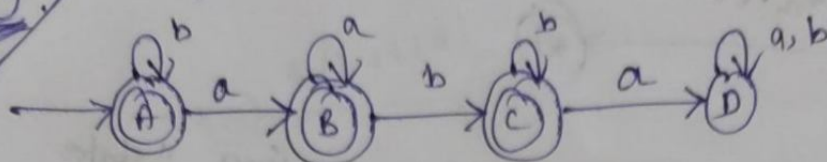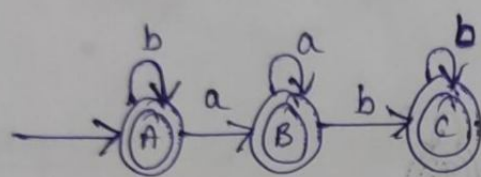
① Find Regular expression from the following.
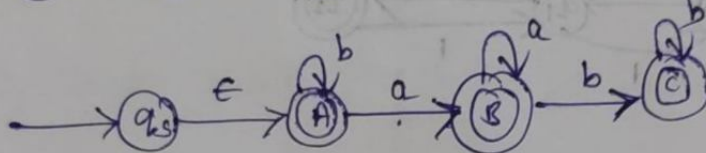

Sol:-

Identify the dead states in a diagram. then Remove that
Dead state. Because, there no path from dead state to
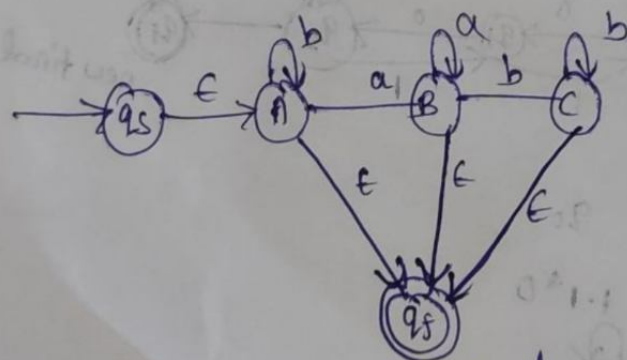Initial state.

Step1:-

Step2:-
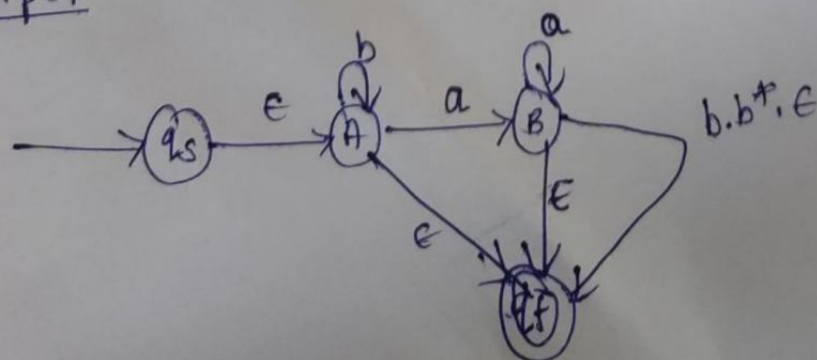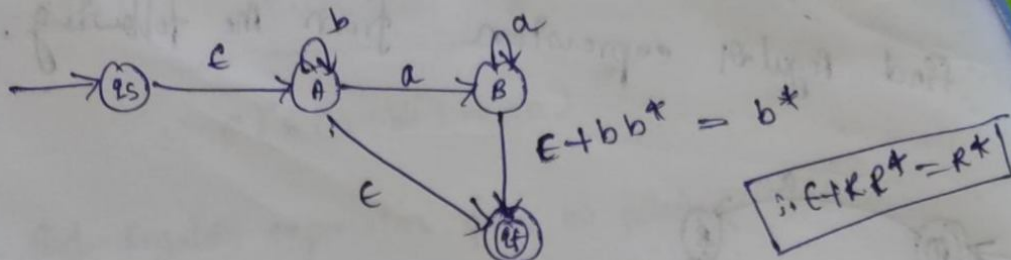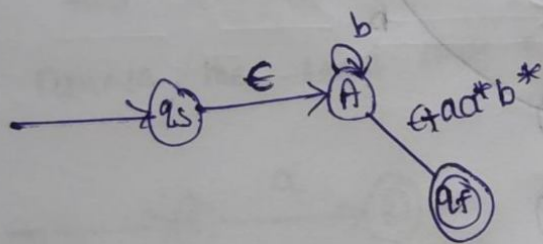

new final.

Step3:- eliminate 'c' from above
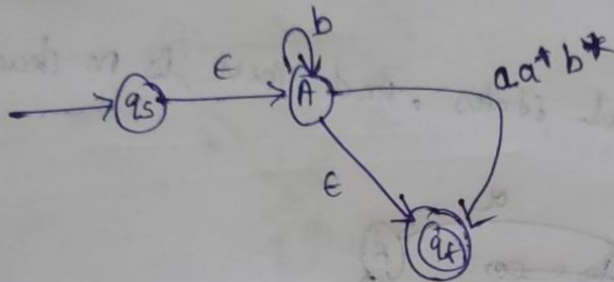
b.b⁺, ∈

$$\epsilon + bb^* = b^*$$

$$\therefore \epsilon + RR^* = R^*$$

step4:- eliminate 'B'

$$aa^* b^*$$

$$\Rightarrow$$

$$\epsilon + aa^* b^*$$

step 5 :-   eliminate 'A'
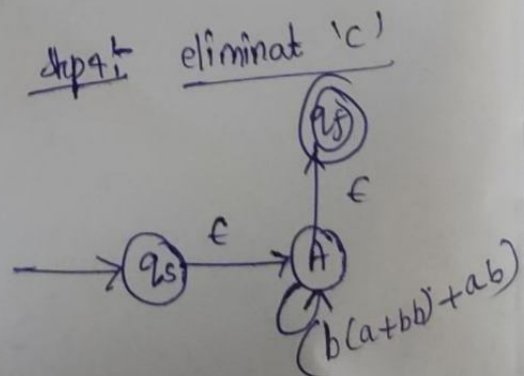

$$\epsilon \cdot b (\epsilon + aa^* b^*)$$

$$\Rightarrow (b^* + b^* aa^* b^*)$$

(2) . find Regular expression from the following.

Start / final
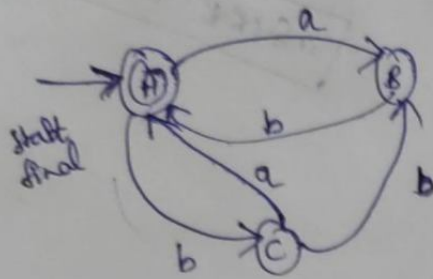
sol) → find for any dead states. And there is no dead state.

Step1 :-

Step2 :-

Step3 :- eliminate 'B'

ab

a+bb

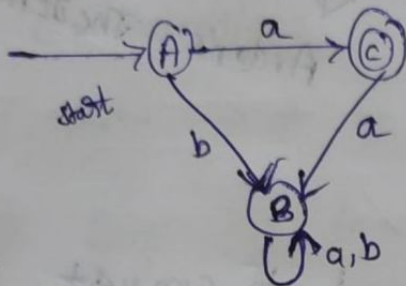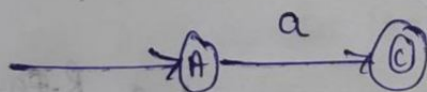**Step4 :-** eliminate 'c'
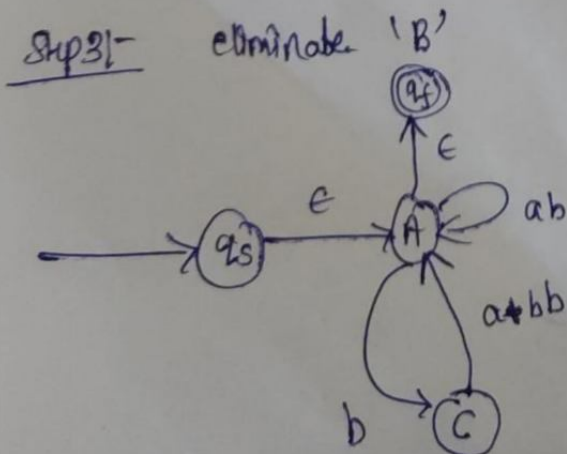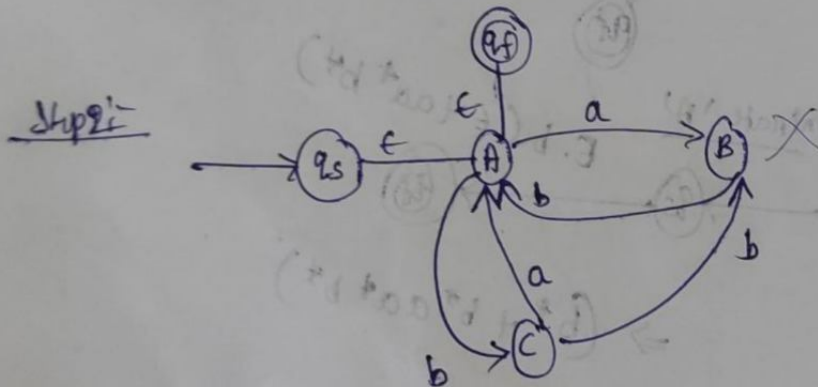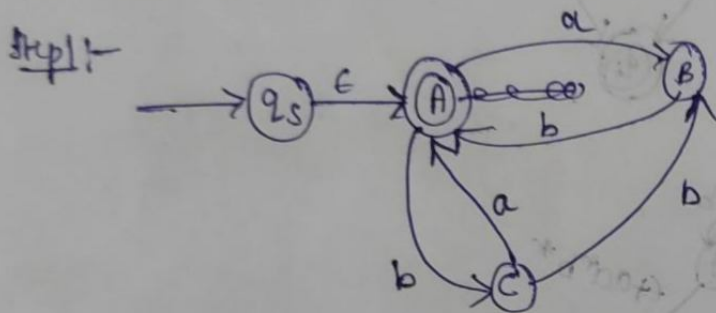
$b(a+bb)^* + ab$

upsi   eliminate 'A'

$$\epsilon \, (b \, (a+bb) + ab)^{*}$$
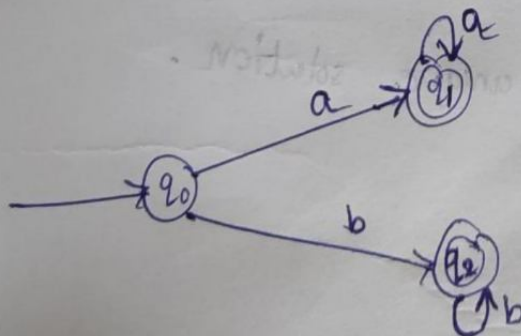
[3]. find Regular expression from the following DFA

SOL :-   first
find dead states or not. Here we have a ded state
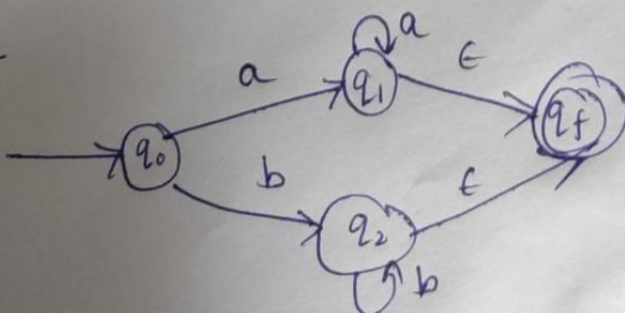remove the dead state 'B'.

∴ R = a

④. Find Regular expression from the following DFA.

SOL :-

$$R \cdot \epsilon = aa^{*} \cdot \epsilon + b \cdot b^{*} \epsilon$$
$$= aa^{+} + bb^{+}$$

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