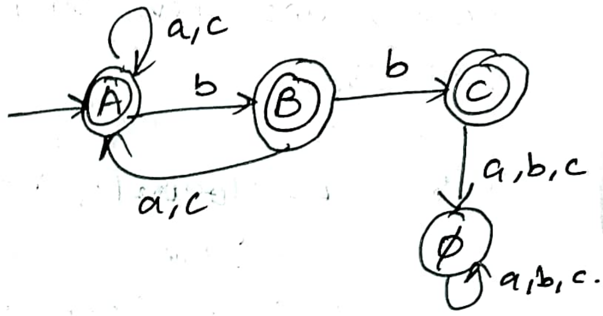
$\delta_D(C, a) = \text{ECLOSE}(\delta_E(C, a))$
$= \text{ECLOSE}(\phi)$.
$= \phi$.

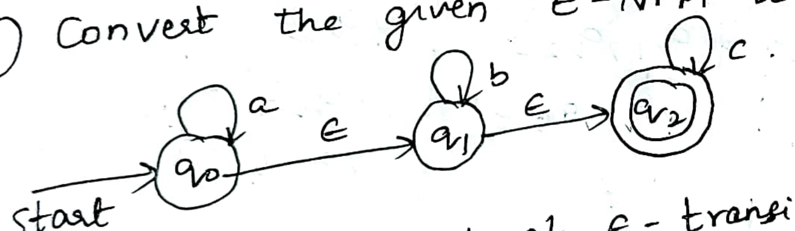
$\delta_D(C, b) = \text{ECLOSE}(\delta_E(C, b))$
$= \text{ECLOSE}(\phi)$
$= \phi$

$\delta_D(C, c) = \text{ECLOSE}(\delta_E(C, c))$
$= \text{ECLOSE}(\phi)$.
$= \phi$.

δ_D	a	b	c
$\rightarrow$ * A	A	B	A
* B	A	C	A
* C	ϕ	ϕ	ϕ



(5) Convert the given ϵ-NFA to DFA.



Soln :- ϵ-NFA Consists of ϵ-transitions (i.e, without reading an i/p symbol, it can change the state from one state to another state. i.e, from q_0 state we can reach state q_1 without reading an input symbol.)

Step 1 :- Construct ϵ-NFA transition table from the above state diagram given above.

δ_E	a	b	c	ϵ
$\rightarrow q_0$	$\{q_0\}$	ϕ	ϕ	$\{q_1\}$
q_1	ϕ	$\{q_1\}$	ϕ	$\{q_2\}$
* q_2	ϕ	ϕ	$\{q_2\}$	ϕ

Step 2:- Then find the ϵ-closure of all the states.

ϵ-closure $(q_0) = \{q_0, q_1, q_2\}$

ϵ-closure of a state represents, the set of all states that are reachable from the particular state by following only ϵ-transitions. (i.e, if we want to find ϵ-closure (q_0), firstly include that state only (i.e, q_0) and then check if any ϵ-transition from the state q_0.)

$\therefore$ ϵ-closure $(q_0) = \{q_0, q_1, q_2\}$.

|||ly ϵ-closure $(q_1) = \{q_1, q_2\}$

ϵ-closure $(q_2) = \{q_2\}$.

Step 3:- find the DFA table.

DFA δ_D	a	b	c
*$\{q_0, q_1, q_2\}$	$\{q_0, q_1, q_2\}$	$\{q_1, q_2\}$	$\{q_2\}$
*$\{q_1, q_2\}$	ϕ	$\{q_1, q_2\}$	$\{q_2\}$
*$\{q_2\}$	ϕ	ϕ	$\{q_2\}$

where input symbols are a, b, c. and the set having final state q_2. make it as final.

(i) $\delta_{DFA}(\{q_0, q_1, q_2\}, a) = \epsilon\text{-closure}(\delta_E\{q_0, q_1, q_2\}, a)$.

$= \epsilon\text{-closure}(\delta_E(q_0, a) \cup \delta_E(q_1, a) \cup \delta_E(q_2, a))$

$= \epsilon\text{-closure}(\{q_0\} \cup \phi \cup \phi)$

$= \epsilon\text{-closure}(q_0)$.

$= \{q_0, q_1, q_2\}$.

|||ly $\delta_D(\{q_0, q_1, q_2\}, b) = \epsilon\text{-closure}(\delta_E\{q_0, q_1, q_2\}, b)$

$= \epsilon\text{-closure}(\delta_E(q_0, b) \cup \delta_E(q_1, b) \cup \delta_E(q_2, b))$

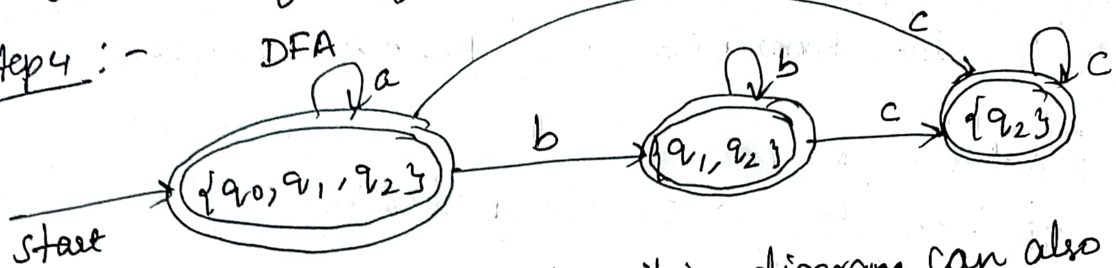
$= \epsilon\text{-closure}(\phi \cup \{q_1\} \cup \phi)$.

$= \epsilon\text{-closure}(q_1)$

$= \{q_1, q_2\}$

and |||ly find for the other states also.

step 4 :- DFA



|||ly the final DFA transition diagram can also be represented as below.

~~where~~ Let $\{q_0, q_1, q_2\} = A$.

$\{q_1, q_2\} = B$

$\{q_2\} = C$.