ε-NFA

Epsilon (ϵ) - NFA

ϵ - NFA

$\rightarrow$ empty Symbols / Null Symbol

$$\{ Q, \leq, q_0, \delta, F \}$$

$$\uparrow$$

$$\delta : Q \times \leq \cup \epsilon \rightarrow 2^Q$$
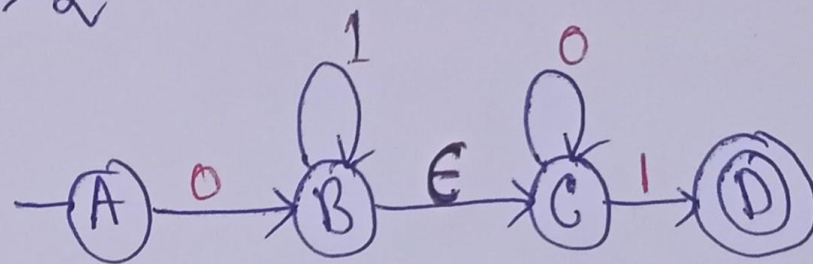
Note: Every state on ϵ goes to itself.

Conversion of ε-NFA to NFA

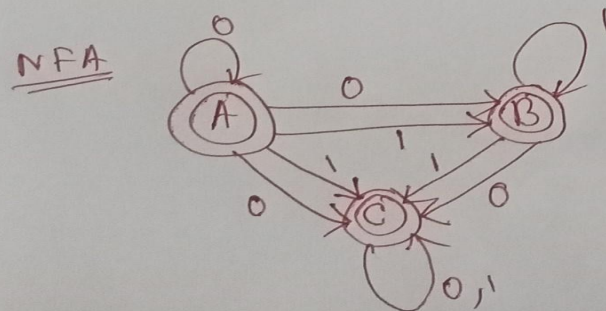Convert the following ε-NFA to its equivalent NFA

State	ε*	input	ε*
:	:	:	:

ε-closure (ε*) – All the states that can be reached from a particular state only be seeing ε symbol.

NFA

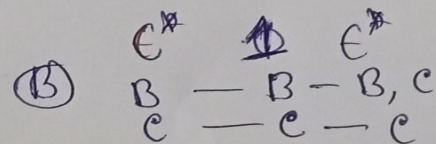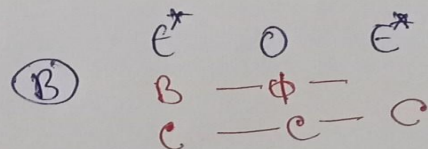|	0	1
→(A)	{A,B,C}	{B,C}
(B)	{C}	{B,C}
(C)	{C}	{C}

⇒ **Final state?**

└→ Any state that can reach the final state only by seeing ε.

(A)
	ε*	0	ε*
	A	A	A
	B	φ	B
	C	C	C

(A)
	ε*	1	ε*
	A	φ	
	B	B	B
	C	C	C

(B)
	ε*	0	ε*
	B	φ	
	C	C	C

(B)
	ε*	1	ε*
	B	B	B, C
	C	C	C

NFA
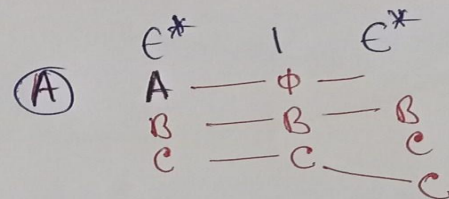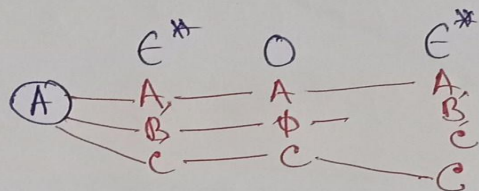
Conversion of ε-NFA to NFA - Example

⇒ Convert the following ε-NFA to its equivalent NFA

$$\xrightarrow{} \text{(A)} \xrightarrow{0} \text{(B)} \xrightarrow{\varepsilon} \text{(C)} \xrightarrow{1} \text{((D))}$$
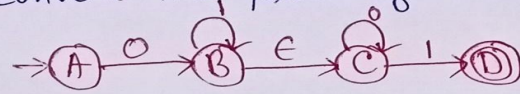
$$\varepsilon^* \; 0 \; \varepsilon^* \qquad \qquad \varepsilon^* \; 1 \; \varepsilon^*$$

NFA

	0	1
→ A		
B		
C		
(D)		

⇒ Convert the following ε-NFA to its equivalent NFA
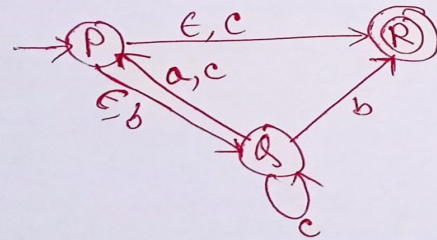
$$\varepsilon^* \, a \, \varepsilon^* \qquad \varepsilon^* \, b \, \varepsilon^* \qquad \varepsilon^* \, c \, \varepsilon^*$$

NFA

	a	b	C
→ P			
Q			
(R)			

Assignment

(29)