

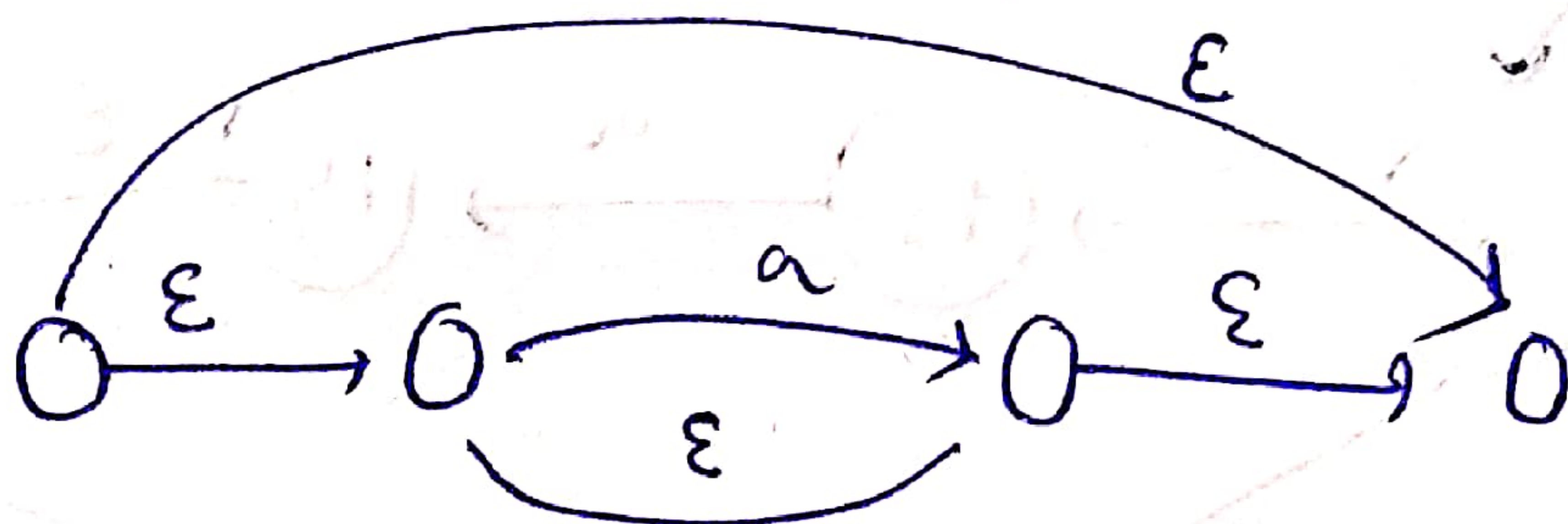
Toc DA

Q1. $(a^*|a)^+ abba^+$

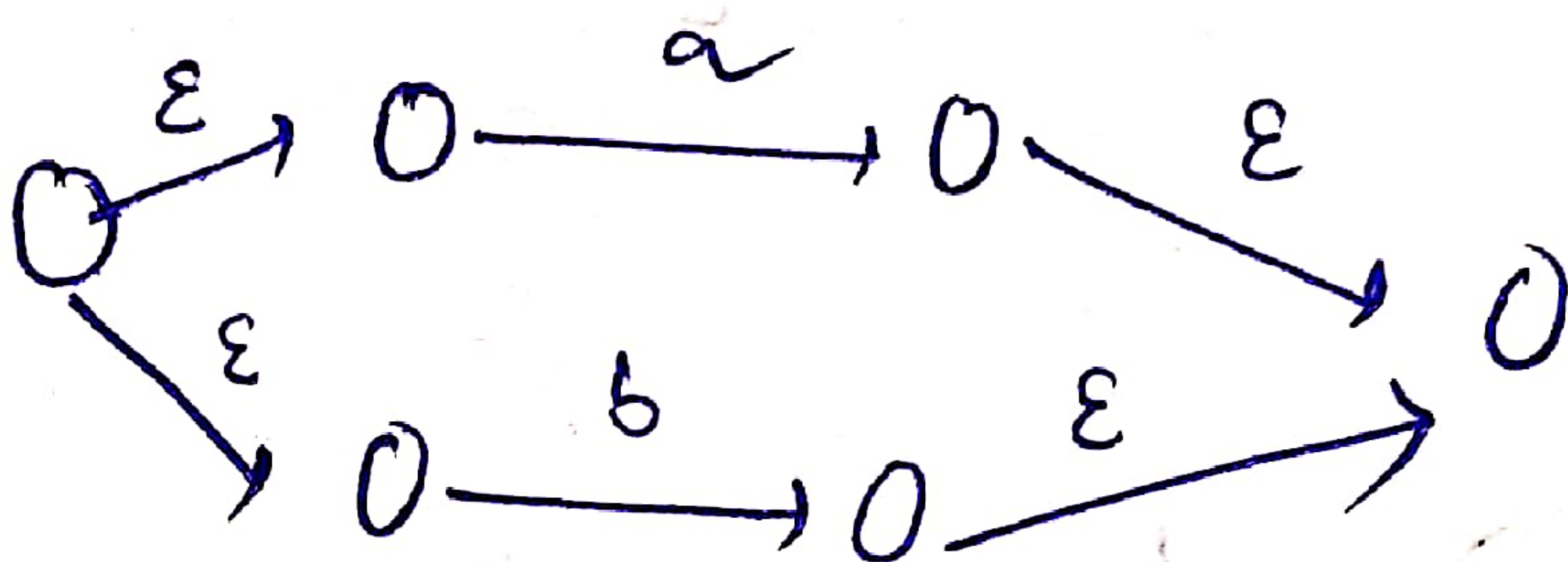
(1) Construct automata for the above regular expression

A) Rules

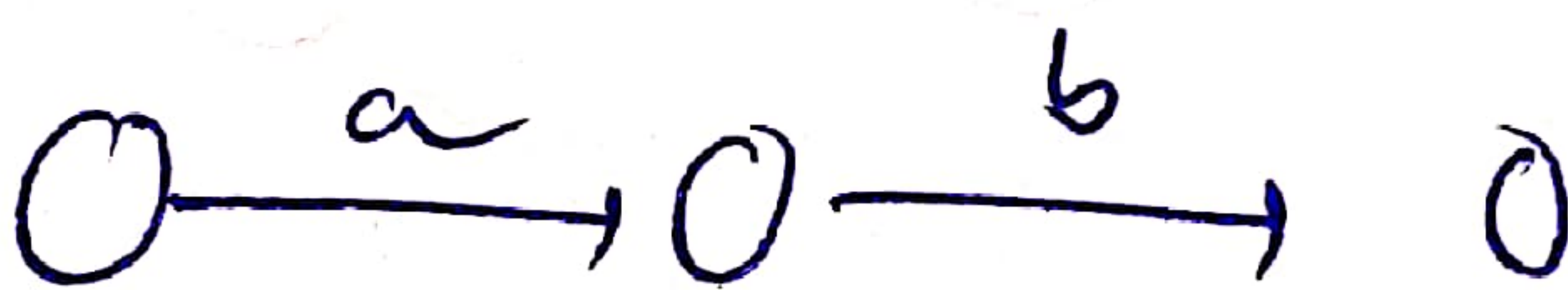
$a^* \Rightarrow$



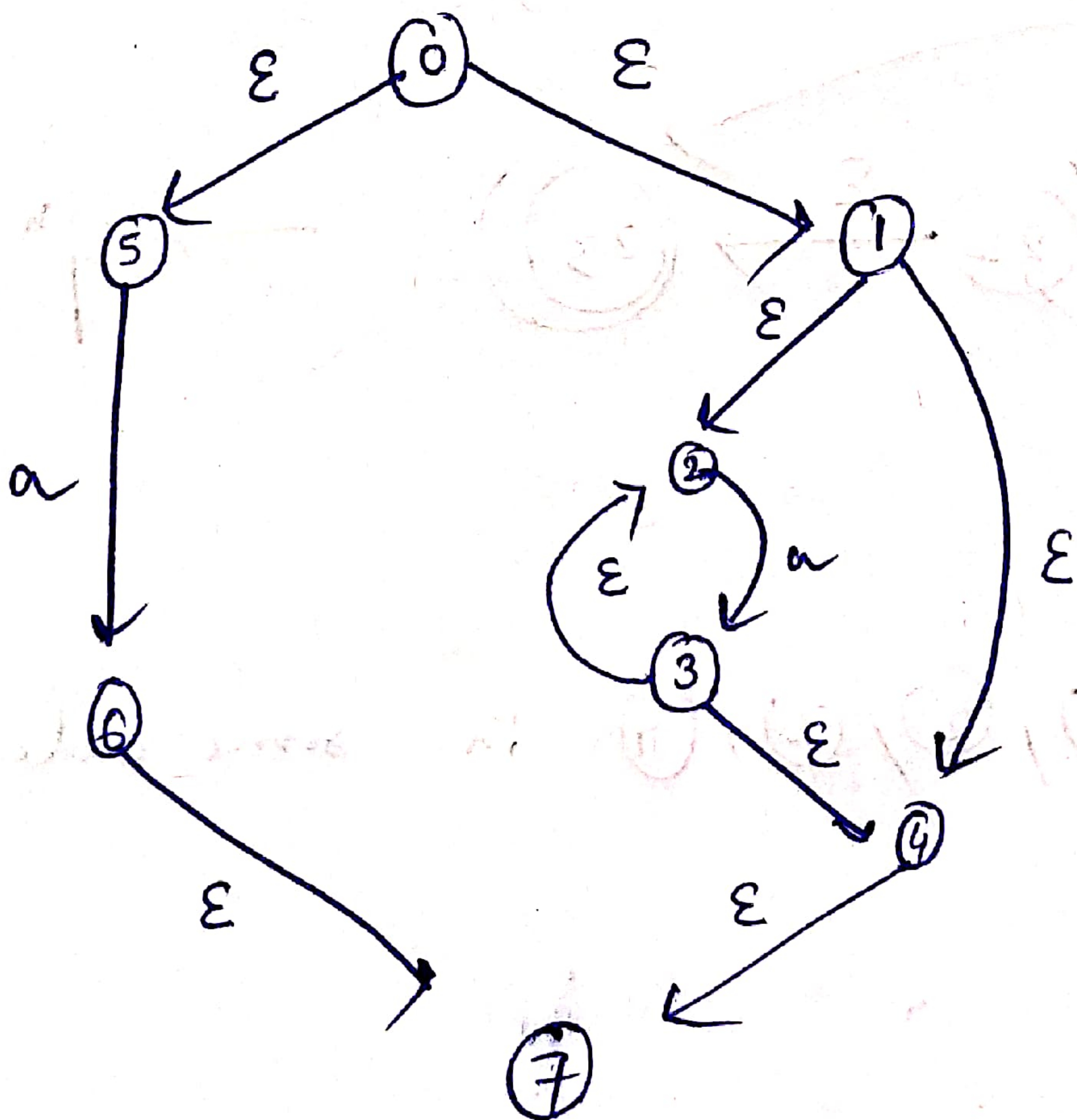
$a/b \Rightarrow$



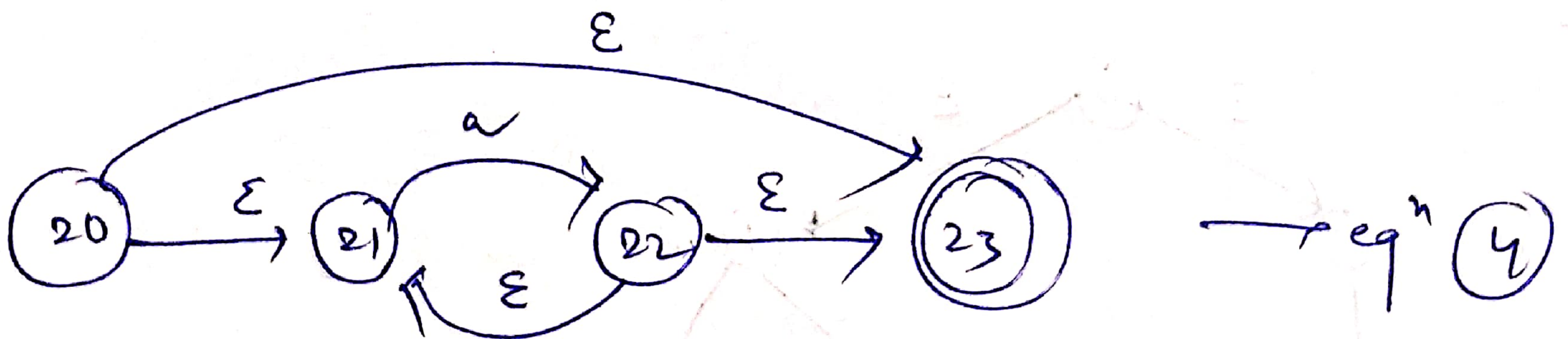
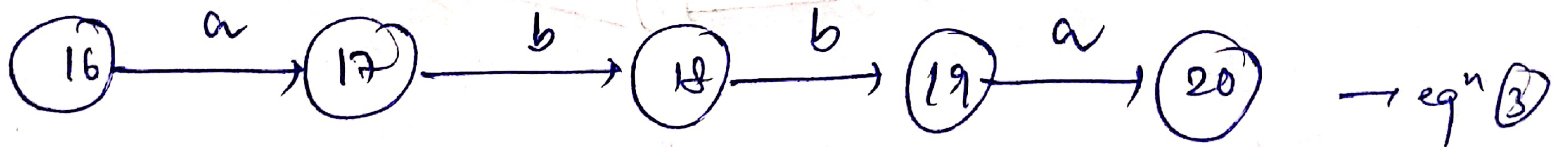
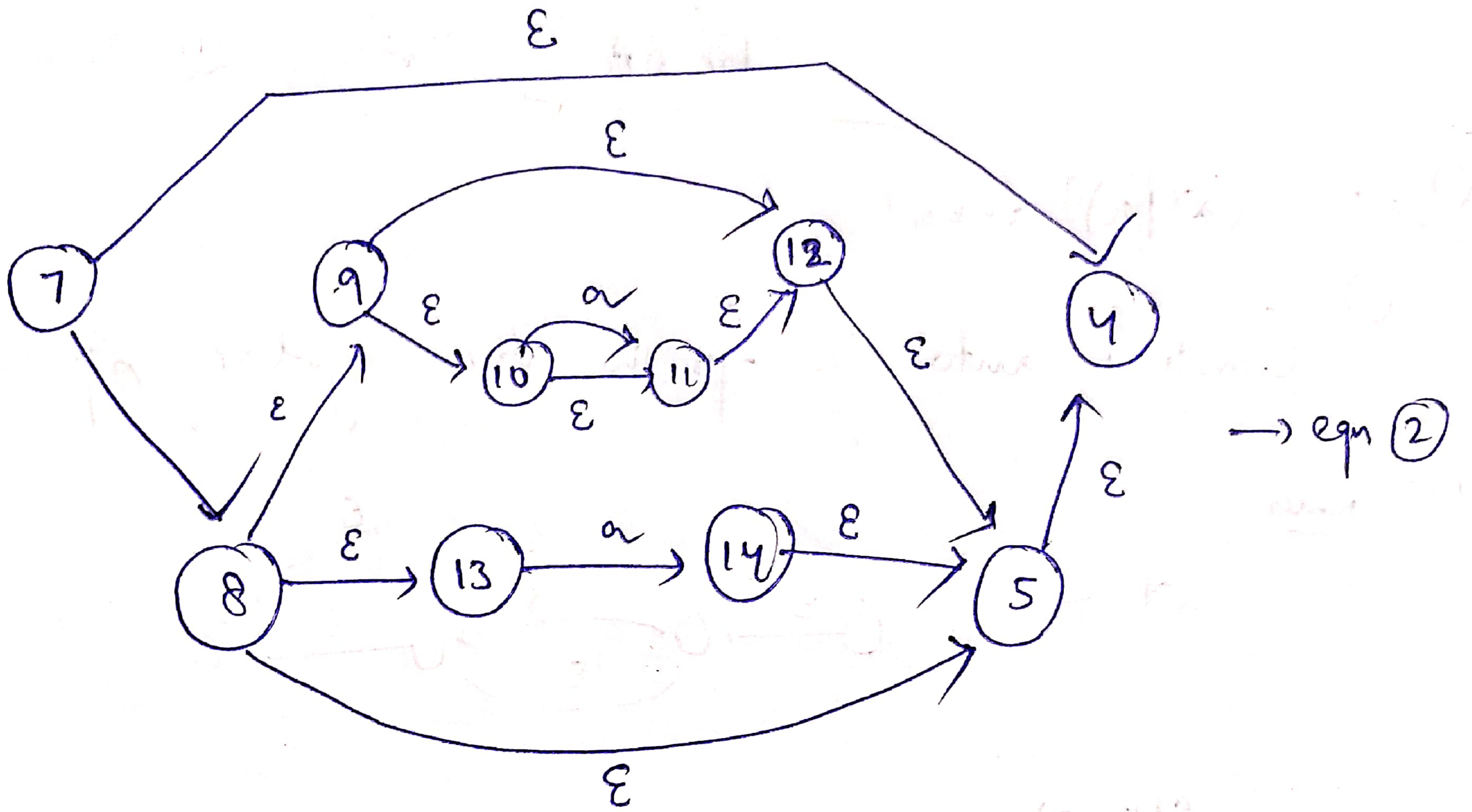
$a.b \Rightarrow$



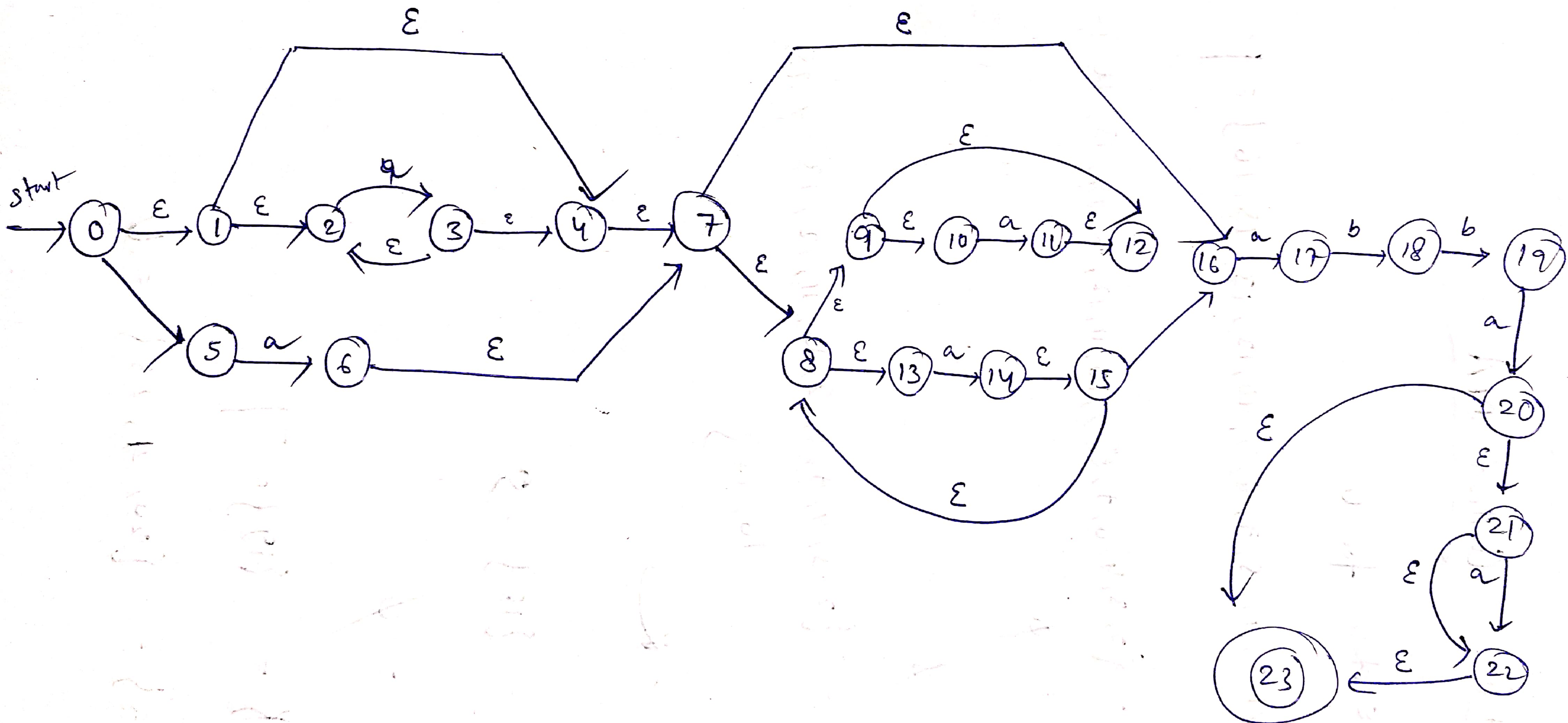
start



\rightarrow eqn 1



now combining eqns (1), (2), (3), (4) in same order



Q1. part-(ii) Construct DFA

A) ϵ -state for 0

$$\{0, 1, 2, 4, 5, 7, 8, 9, 10, 12, 13, 15, 16\} = P$$

$$\delta(P, a) = \{2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17\}$$
$$= \emptyset$$

$$\delta(P, b) = \emptyset$$

$$\delta(Q, a) = \{2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17\}$$
$$= R$$

$$\delta(Q, b) = \{18\} = S$$

$$\delta(S, a) = \emptyset$$

$$\delta(S, b) = \{19\} = T$$

$$\delta(T, a) = \{20, 21, 23\} = U$$

$$\delta\{T, b\} = \phi$$

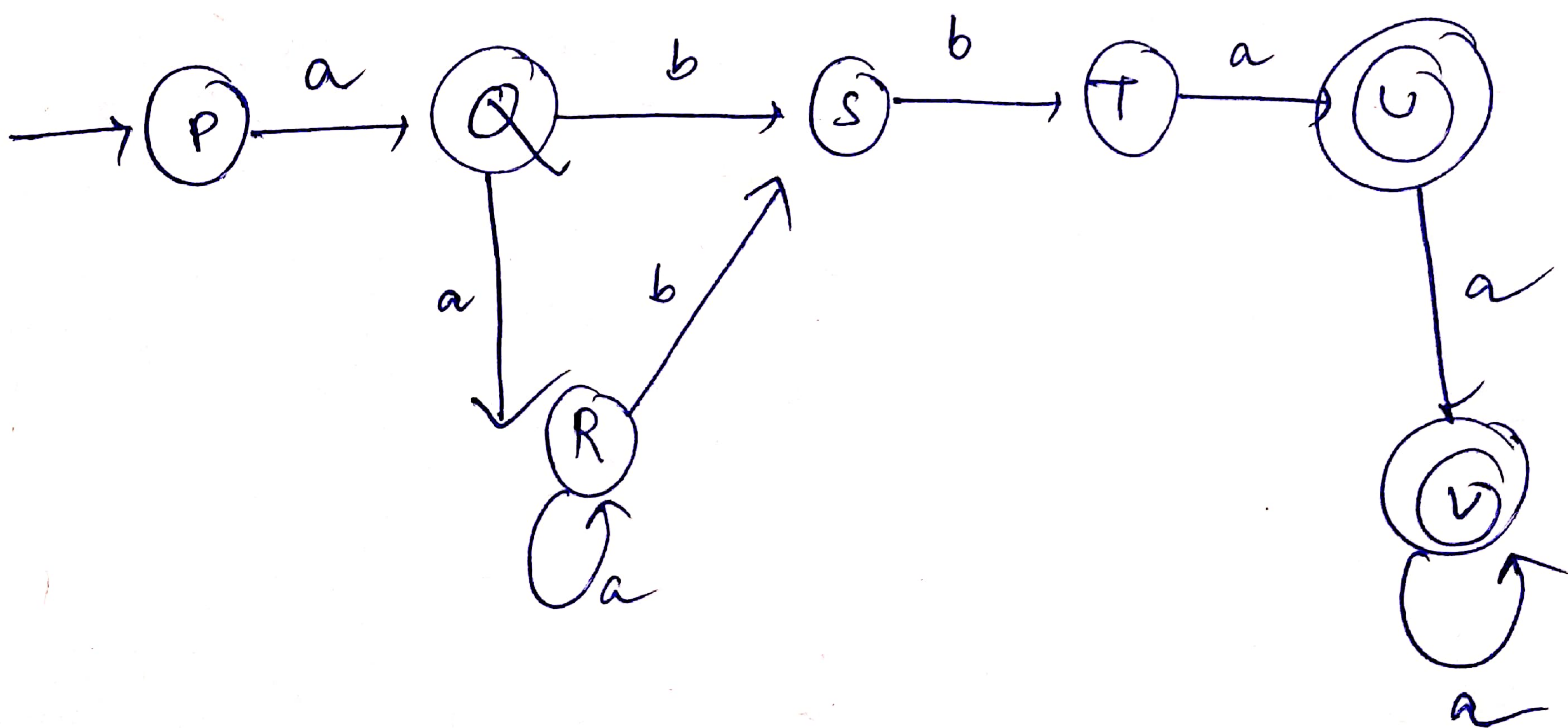
$$\delta\{U, a\} = \{21, 22, 23\} = \checkmark$$

$$\delta\{U, b\} = \phi$$

$$\delta\{V, a\} = \{21, 22, 23\} = b$$

$$\delta\{V, b\} = \phi$$

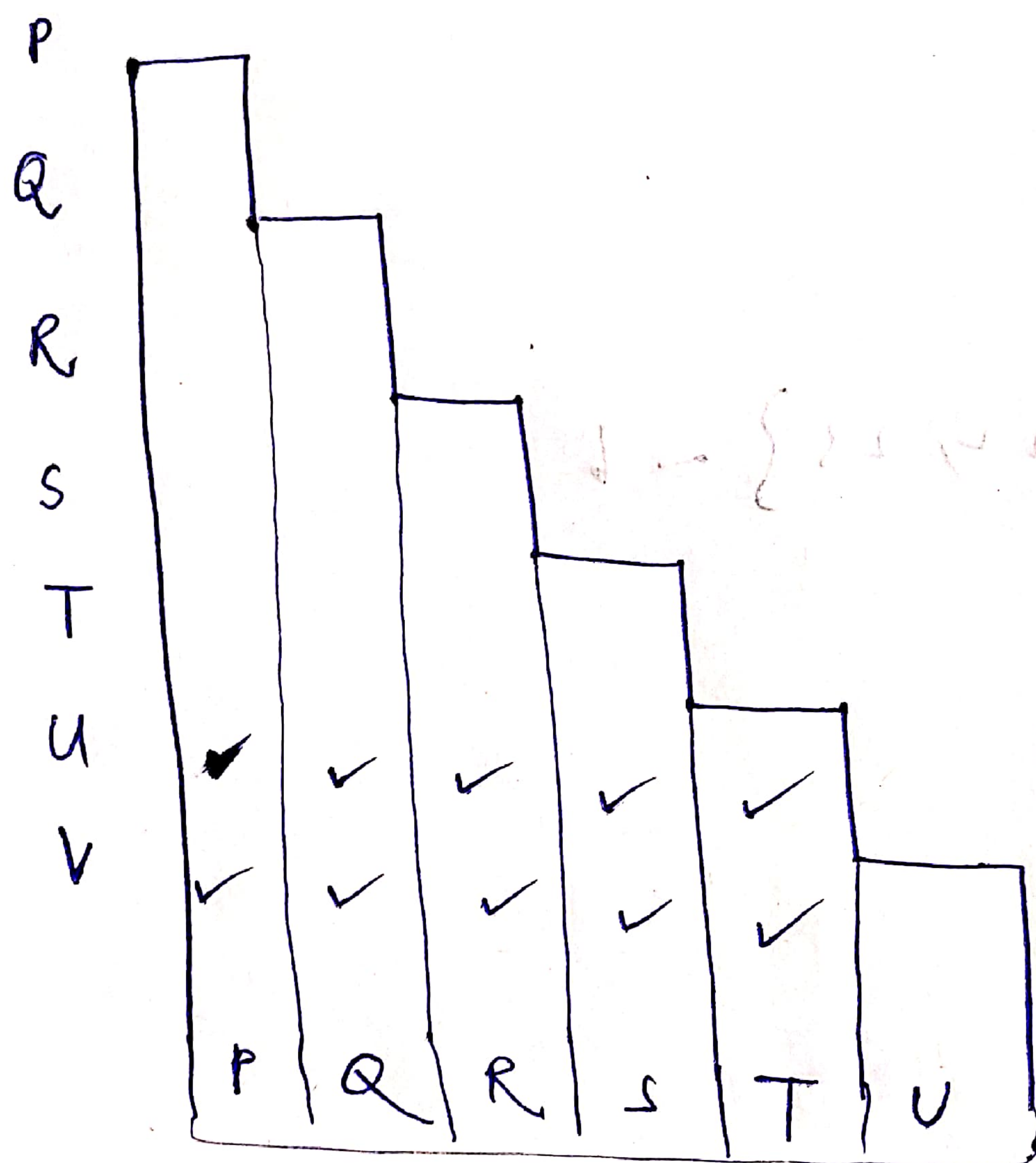
DFA :



Q1.

(iii)

minimized DFA



0-equivalent

$P_0 = \{\text{final}\} \quad \{\text{non-final}\}$
 $\{U, V\} \quad \{P, Q, R, S, T\}$

1-equivalent

(P, Q)

$\delta(P, a) = Q \notin F$
 $\delta(Q, a) = R \notin F$

$\delta(P, b) = V \in F$
 $\delta(Q, b) = V \in F$

\therefore 1 equivalent

(R, S)

$$\delta(R, a) = R \notin F$$

$$\delta(R, b) = S \notin F$$

$$\delta(S, a) = \emptyset \in F$$

$$\delta(S, b) = T \notin F$$

(S, T)

$$\delta(T, a) = U \in F$$

$$\delta(T, b) = \emptyset \in F$$

$$\delta(S, a) = \emptyset \in F$$

$$\delta(S, b) = T \in F$$

\therefore not 1 equivalent.

minimized DFA :

