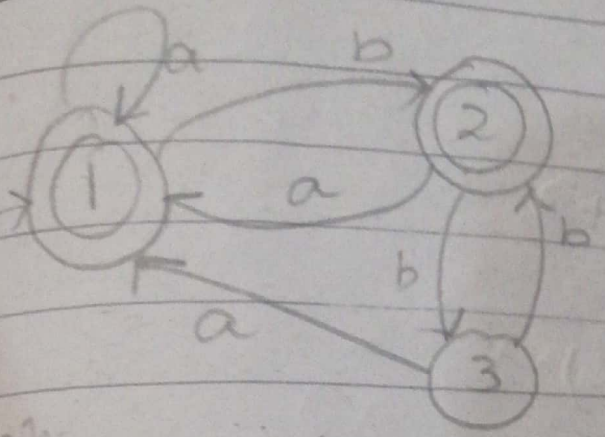
20k-0177

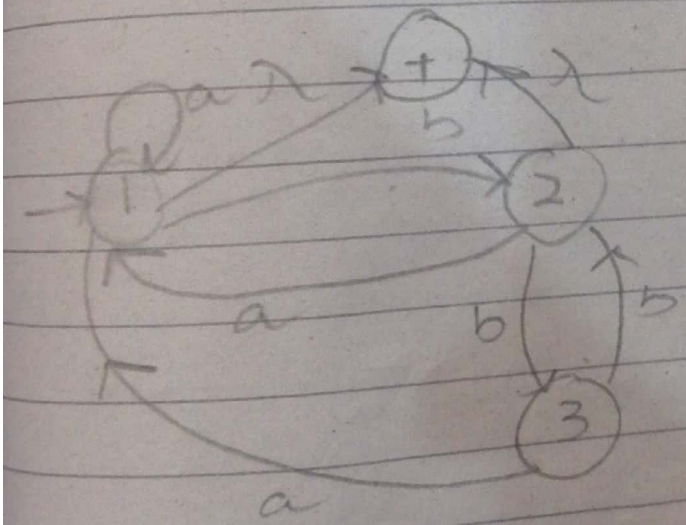
Assignment # 2

Question # 01

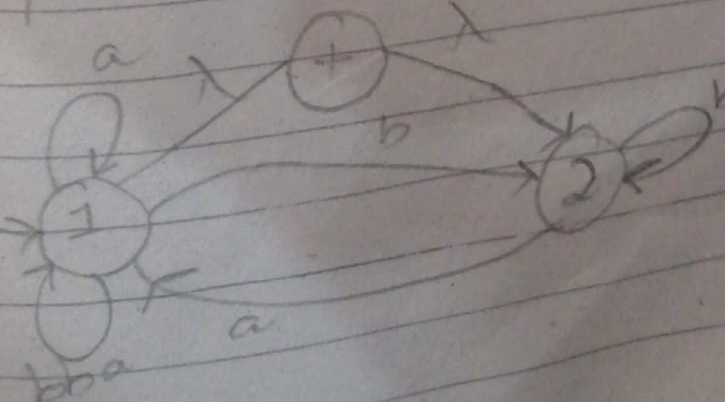


Step 1:

Making single initial & final state

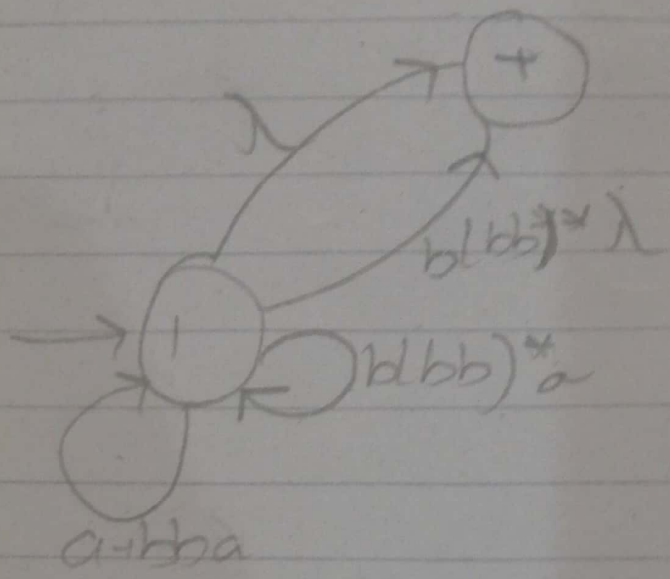


(Step 2) Eliminating state 3

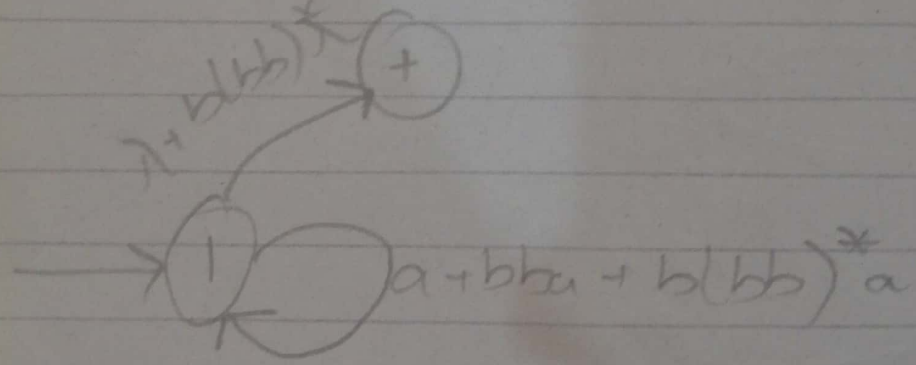


Step 3:

Eliminating state 2



Step 4: Simplifying state 1

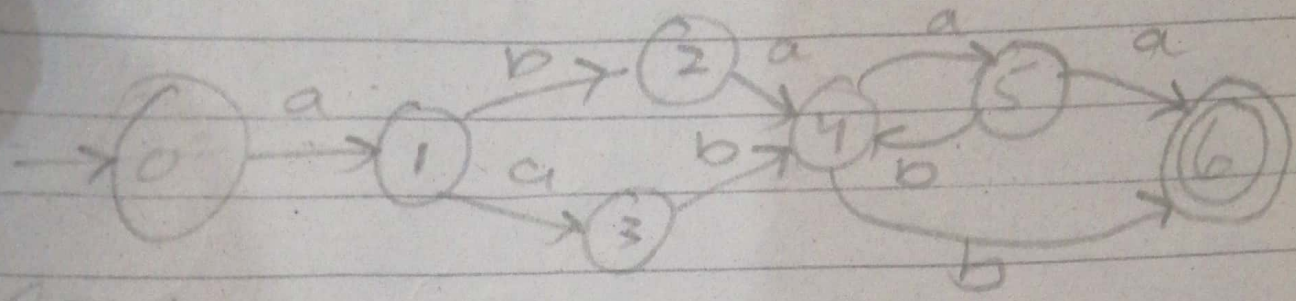


The required RE is

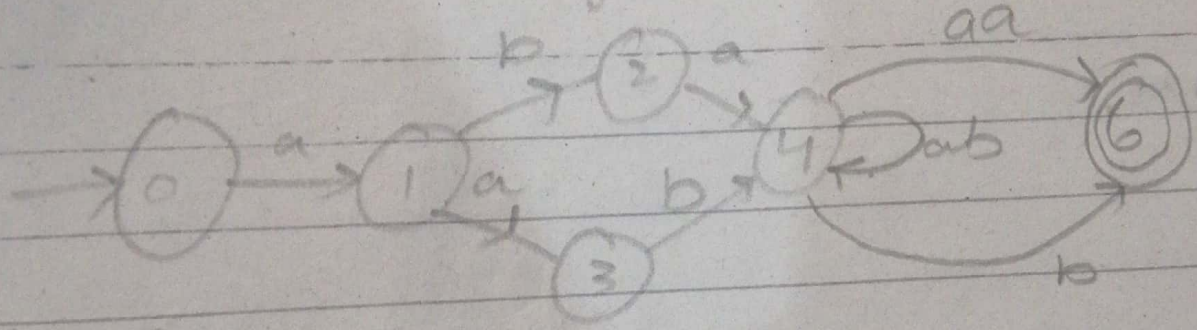
RE:

$$\{a+bba+b(bb)^* a\}^* \{\lambda + b(bb)^* \lambda\}$$

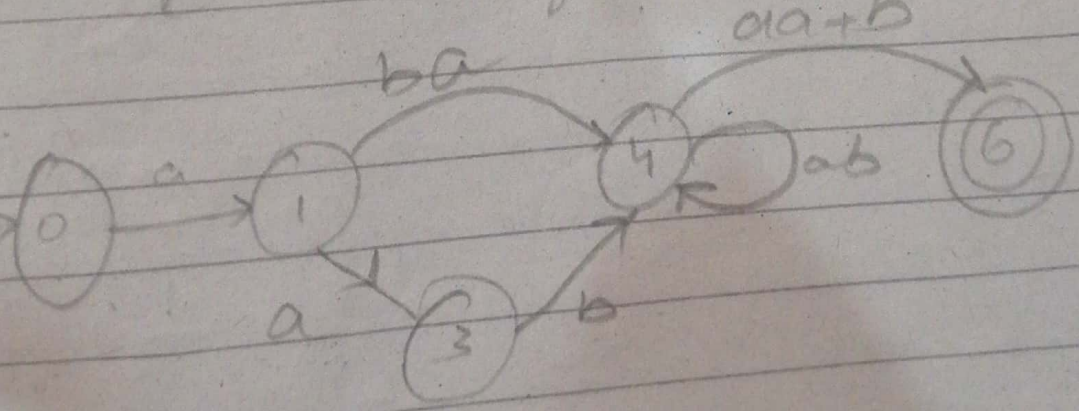
Question #02:-



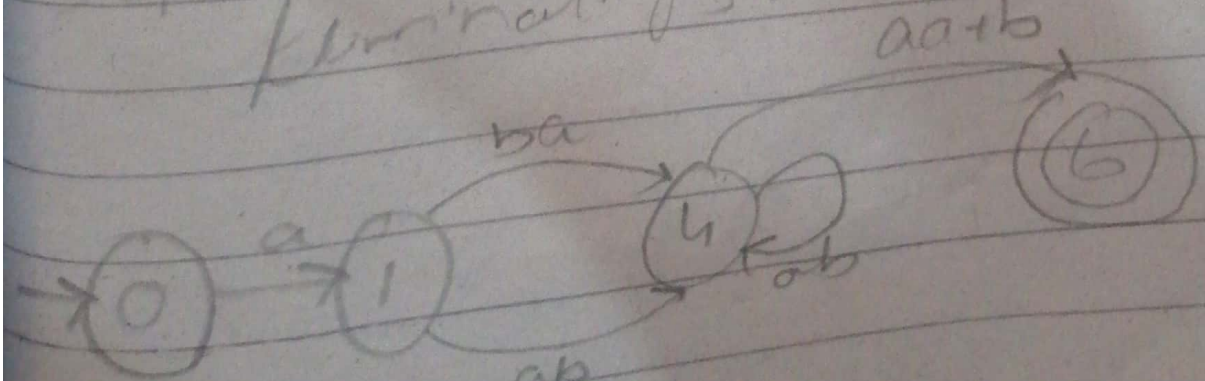
Step 1:
Eliminating state 5:



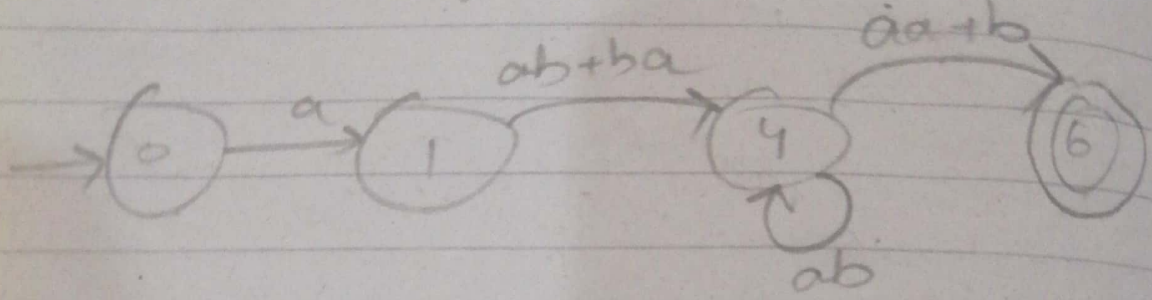
Step 2:
Eliminating State 2



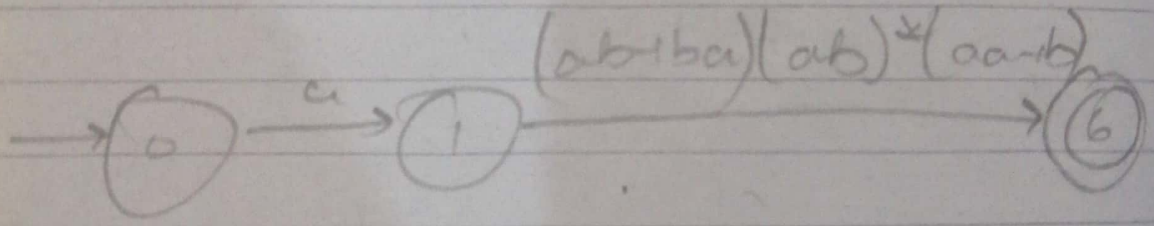
Step 3:
Eliminating state 3:



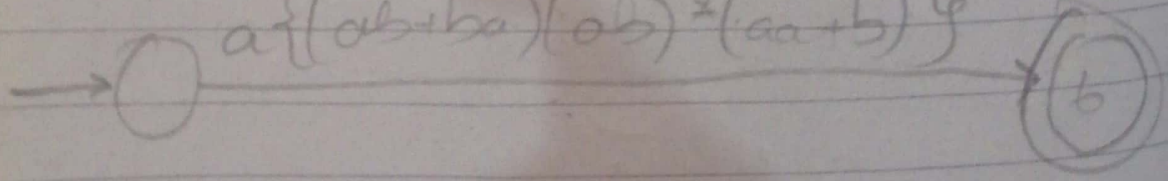
Step 4
Simplifying state 4.



Step 5:
Eliminating state 4



Step 6:
Eliminating state 1

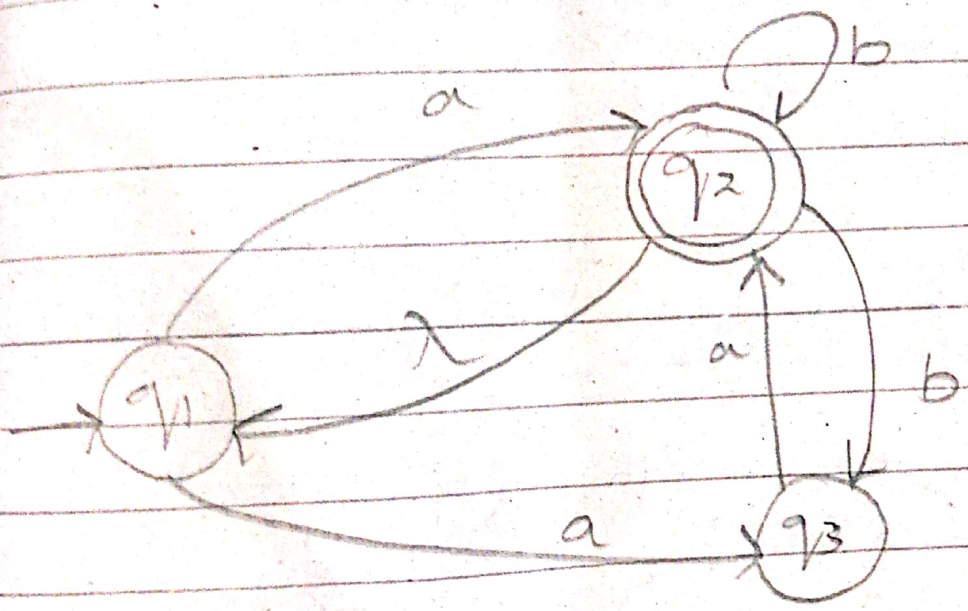


R.E:-

$a\{(ab+ba)(ab)^*(aa+b)\}$.

Question #03:-

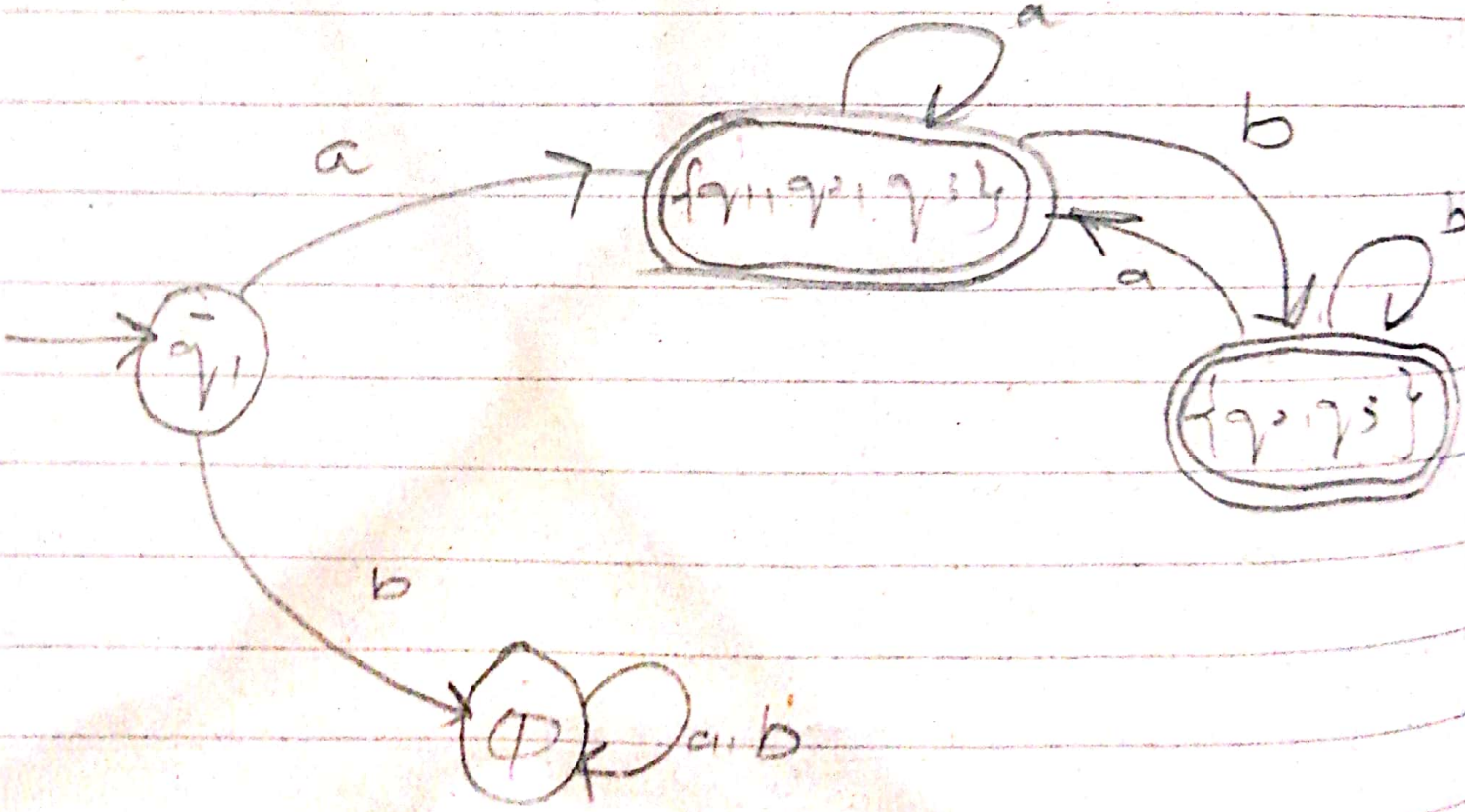
Construct the DFA from the epsilon NFA given in figure



Transition Table

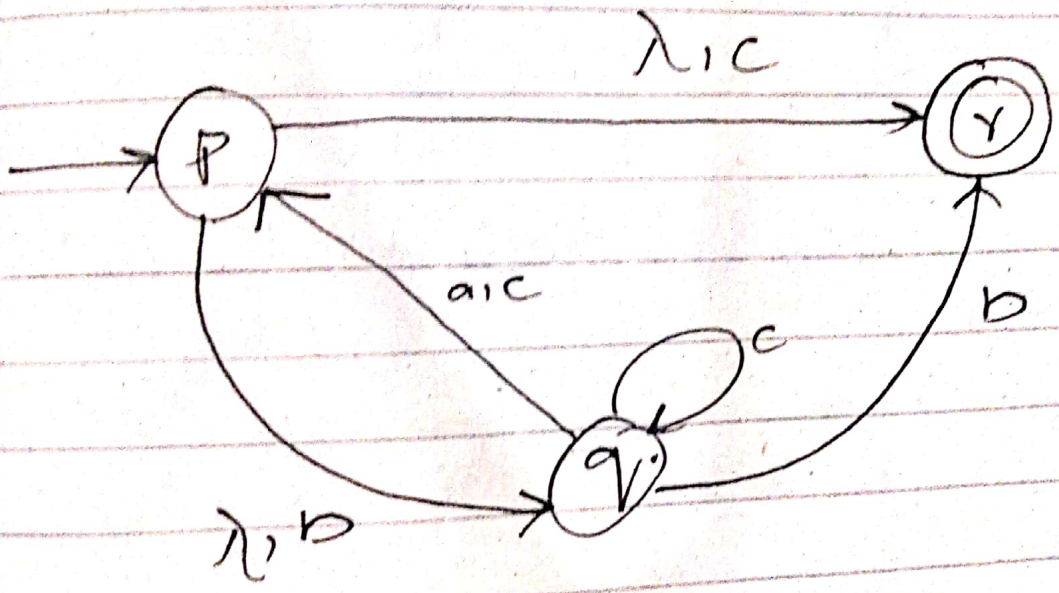
States	a	b
- q1	{q1, q2, q3}	∅
+ q2	{q1, q2, q3}	{q2, q3}
q3	{q1, q2}	∅

States	a	b
→ q_1	$\{q_1, q_2, q_3\}$	ϕ
$\{q_1, q_2, q_3\}$	$\{q_1, q_2, q_3\}$	$\{q_2, q_3\}$
ϕ	ϕ	ϕ
$\{q_2, q_3\}$	$\{q_1, q_2, q_3\}$	$\{q_2, q_3\}$



Question #04

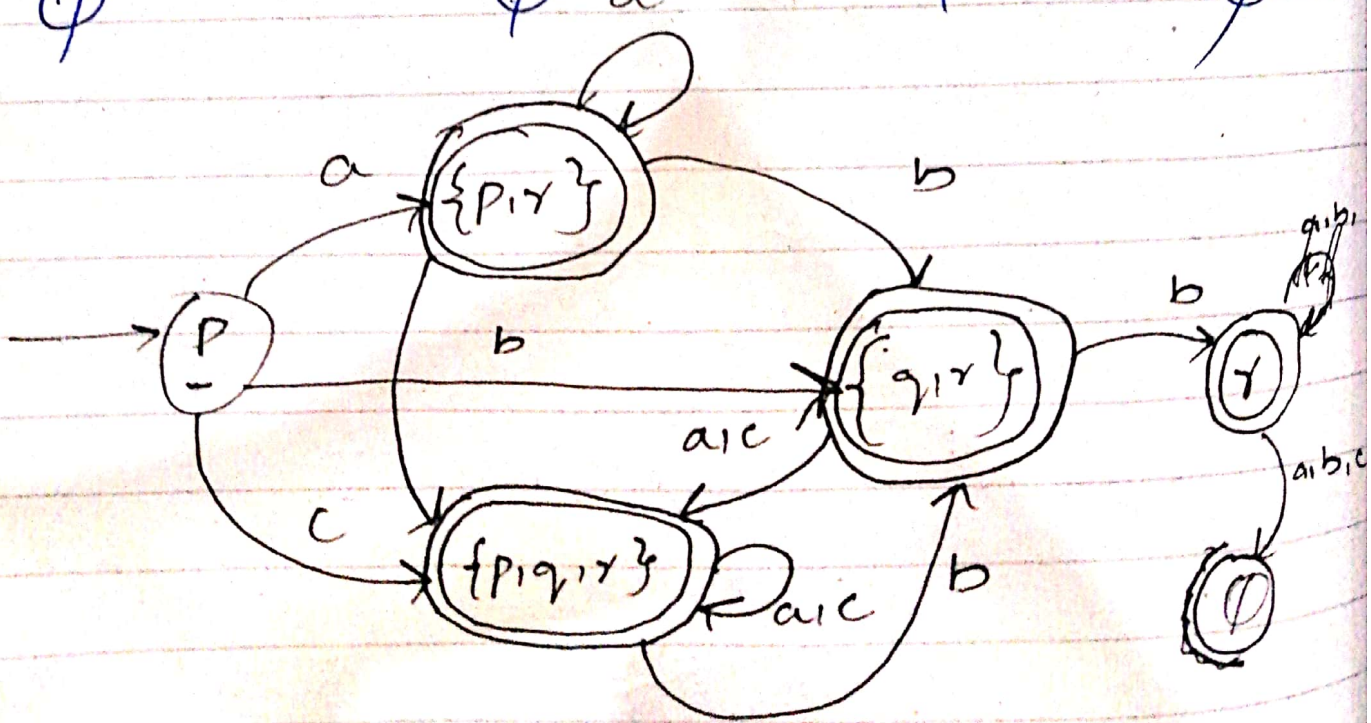
Construct the DFA from epsilon NFA.



Transition Table

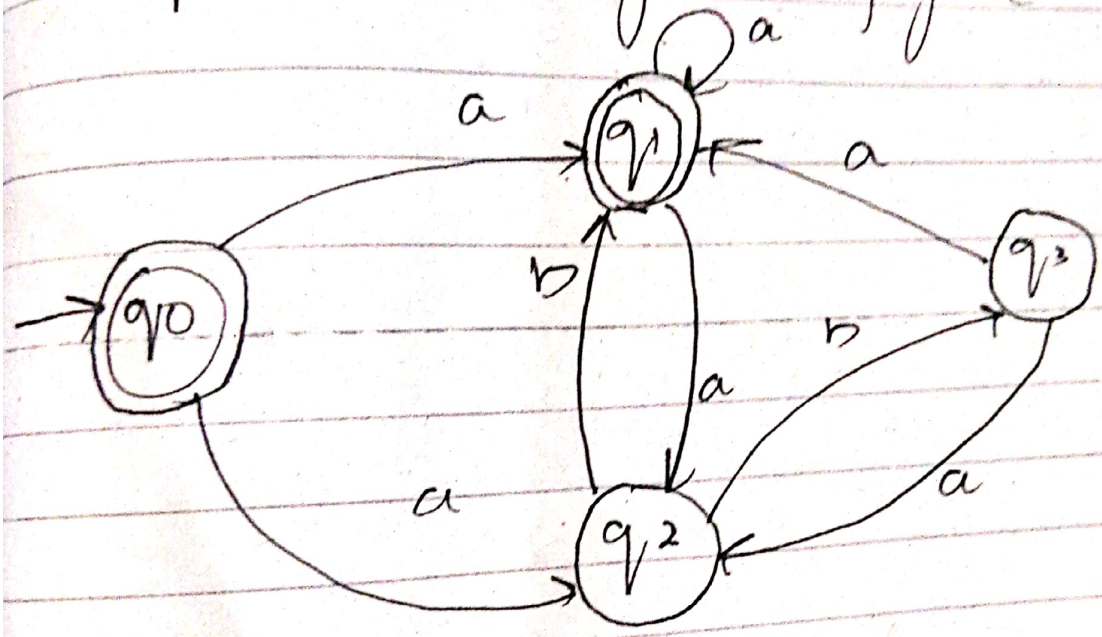
States	a	b	c
p	{p, r}	{q, r}	{p, q, r}
q	{p, q, r}	{r}	{p, q, r}
r	ϕ	ϕ	ϕ

States	a	b	c
→p	{p,r}	{q,r}	{p,q,r}
←{p,r}	{p,r}	{q,r}	{p,q,r}
←{q,r}	{p,q,r}	{r}	{p,q,r}
←{p,q,r}	{p,q,r}	{q,r}	{p,q,r}
←r	ϕ	ϕ	ϕ
ϕ	ϕ	ϕ	ϕ



Question #05:-

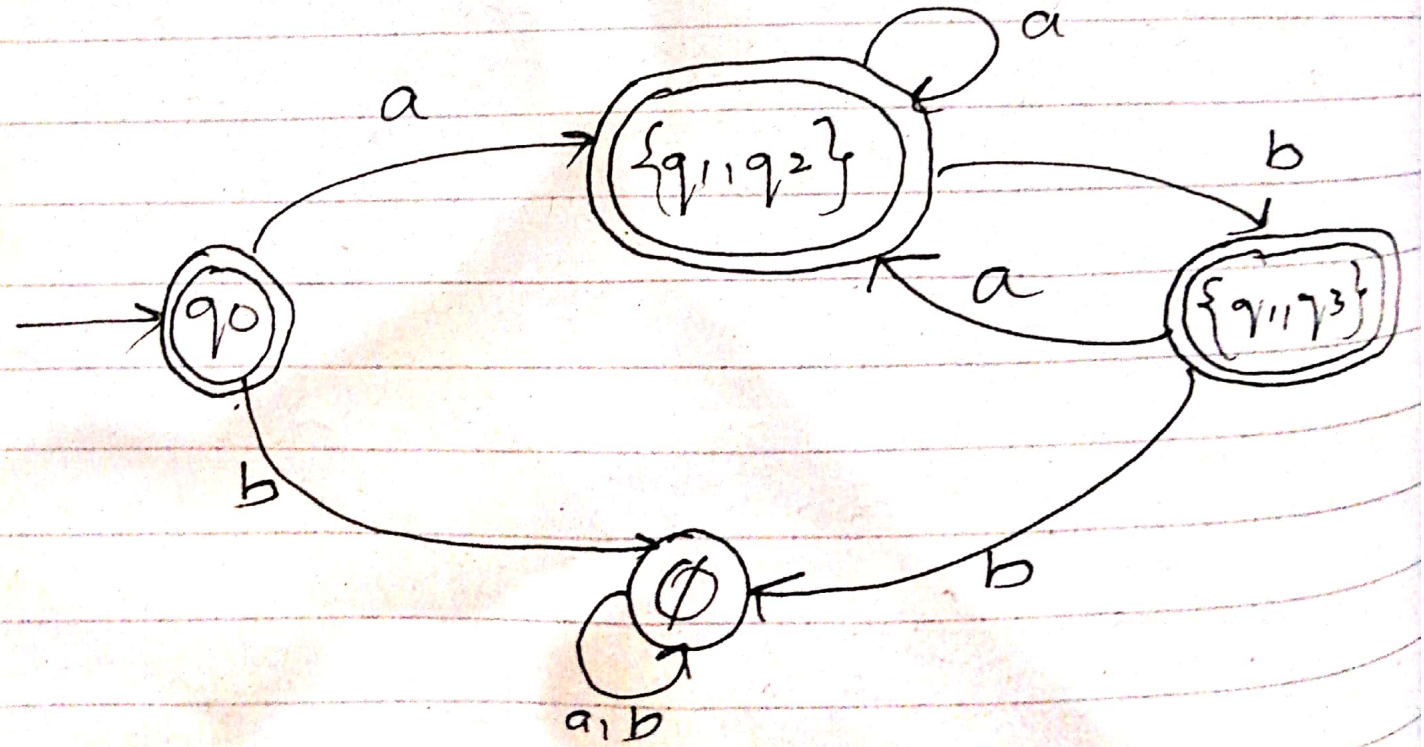
Construct the DFA from the epsilon NFA given in figure.



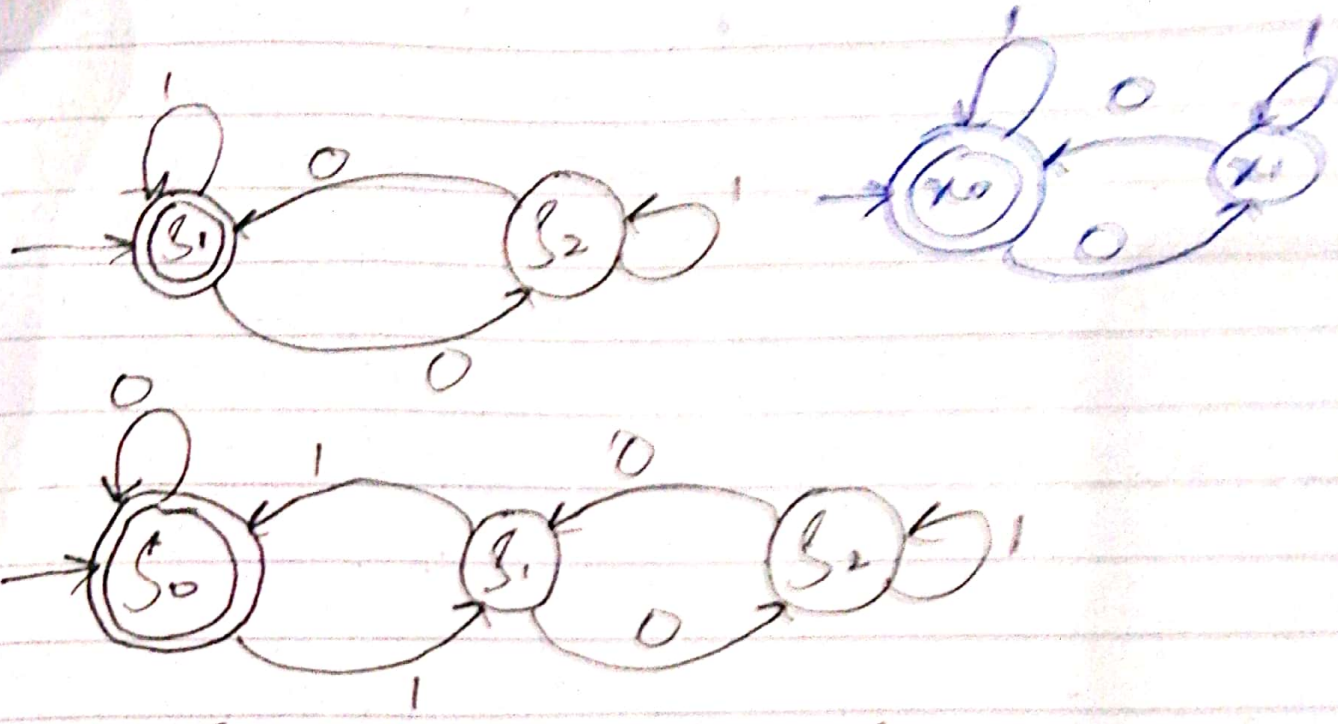
Transition Table

States	a	b
→ q0	{q1, q2}	∅
* q1	{q1, q2}	∅
+ q2	∅	{q1, q3}
q3	{q1, q2}	∅

States	a	b
→q0	{q1,q2}	∅
+{q1,q2}	{q1,q2}	{q1,q3}
∅	∅	∅
+{q1,q3}	{q1,q2}	∅



Question #06:-



1. Find the concatenation of FA1 & FA2 given in figure 6 & figure 7.

For FA1

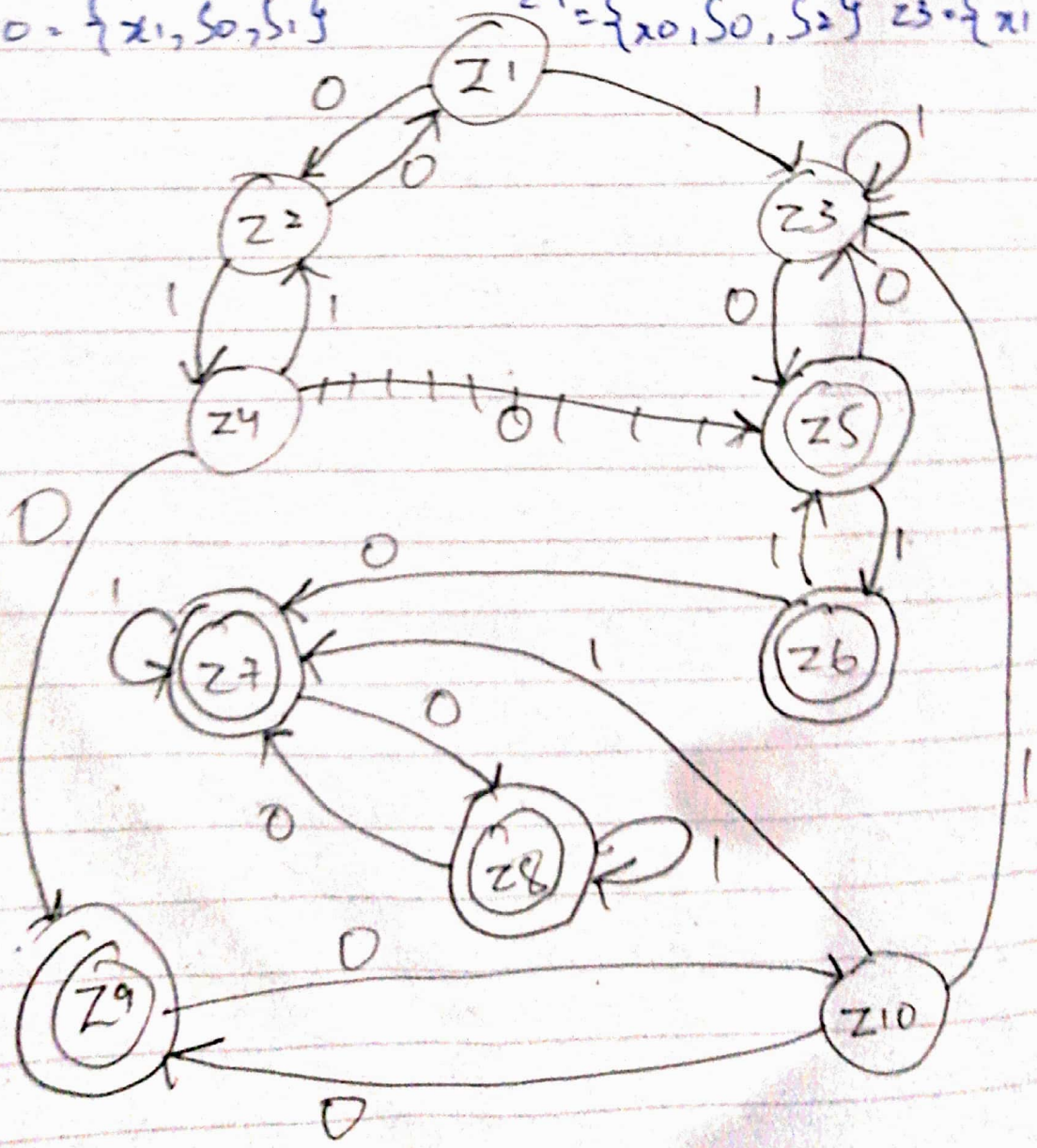
let $x_0 = S_1$ & $x_1 = S_2$

to avoid confusion.

Transition Table

States	a 0	b 1
$\rightarrow x_0 = Z_1$	$Z_2 = x_1$	$\{S_0, x_0\} = Z_3$
$\{x_1\} = Z_2$	$\{x_0, S_0\} = Z_3$	Z^2
$\{S_0, x_0\} = Z_3$	$\{S_0, x_1\} = Z_4$	$\{S_1, x_0\} = Z_5$
$\{S_0, x_1\} = Z_4$		
$\{S_1, x_0\}$		

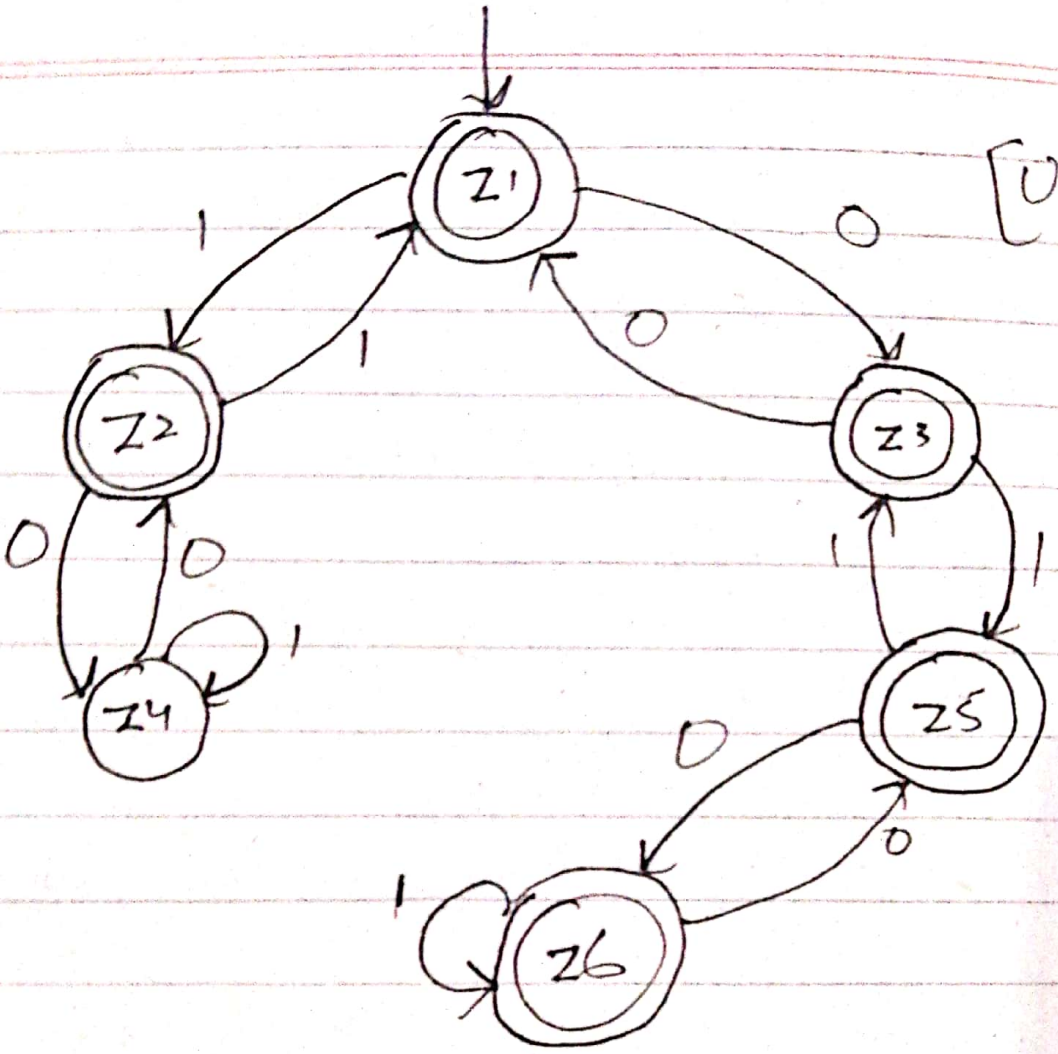
$S(z_i, \varepsilon)$	0	1
$z_1 = \{x_0, S_0\}$	$z_2 = \{x_1, S_0\}$	$z_3 = \{x_0, S_0, S_1\}$
$z_2 = \{x_1, S_0\}$	$z_4 = \{x_0, S_0\}$	$z_4 = \{x_1, S_1\}$
$z_3 = \{x_0, S_0, S_1\}$	$z_5 = \{x_1, S_0, S_2\}$	$z_3 = \{x_0, S_0, S_1\}$
$z_4 = \{x_1, S_1\}$	$z_3 = \{x_0, S_0, S_1\}$	$z_2 = \{x_1, S_0\}$
$+z_5 = \{x_1, S_0, S_2\}$	$z_3 = \{x_0, S_0, S_1\}$	$z_6 = \{x_1, S_1, S_0\}$
$+z_6 = \{x_1, S_1, S_2\}$	$z_7 = \{x_0, S_0, S_2, S_1\}$	$z_5 = \{x_1, S_0, S_2\}$
$+z_7 = \{x_0, S_0, S_2, S_1\}$	$z_8 = \{x_1, S_0, S_1, S_2\}$	$z_7 = \{x_0, S_0, S_2, S_1\}$
$+z_8 = \{x_1, S_0, S_1, S_2\}$	$z_7 = \{x_0, S_0, S_2, S_1\}$	$z_8 = \{x_1, S_1, S_0, S_2\}$
$z_9 = \{x_0, S_0, S_2\}$	$z_{10} = \{x_1, S_0, S_1\}$	$z_7 = \{x_0, S_0, S_2, S_1\}$
$z_{10} = \{x_1, S_0, S_1\}$	$z_9 = \{x_0, S_0, S_2\}$	$z_3 = \{x_1, S_1, S_0\}$



2. Find the Union of FA1 & FA2 given in figure 6

Making Transition Table:-

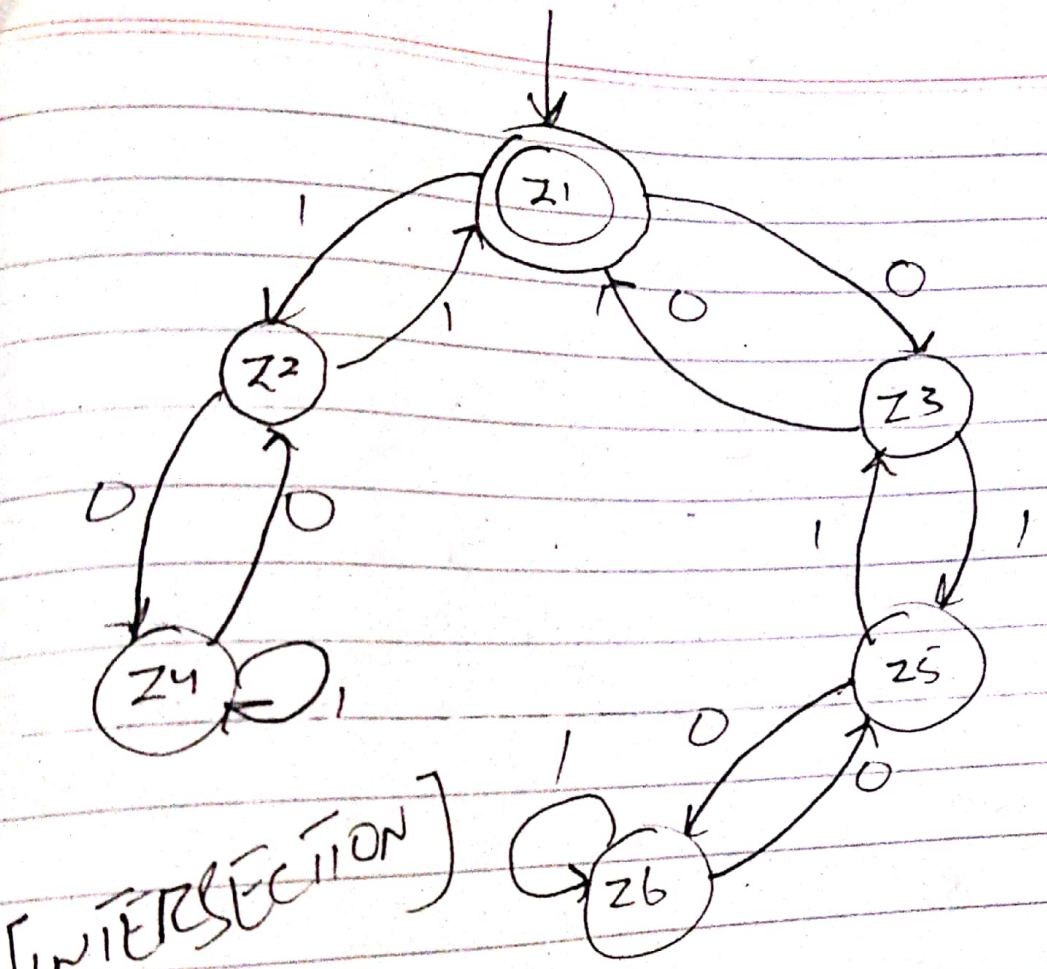
States	1	0
$\rightarrow z_1 = \{S_1, S_0\}$	$z_2 = \{S_1, S_1\}$	$z_3 = \{S_2, S_0\}$
$\rightarrow z_2 = \{S_1, S_1\}$	$z_1 = \{S_1, S_0\}$	$z_4 = \{S_2, S_2\}$
$\rightarrow z_3 = \{S_2, S_0\}$	$z_5 = \{S_2, S_1\}$	$z_1 = \{S_1, S_0\}$
$z_4 = \{S_2, S_2\}$	$z_4 = \{S_2, S_2\}$	$z_2 = \{S_1, S_1\}$
$\rightarrow z_5 = \{S_2, S_1\}$	$z_3 = \{S_2, S_0\}$	$z_6 = \{S_1, S_2\}$
$\rightarrow z_6 = \{S_1, S_2\}$	$z_6 = \{S_1, S_2\}$	$z_5 = \{S_2, S_1\}$



[UNION]

c) Find the intersection of FA1 & FA2

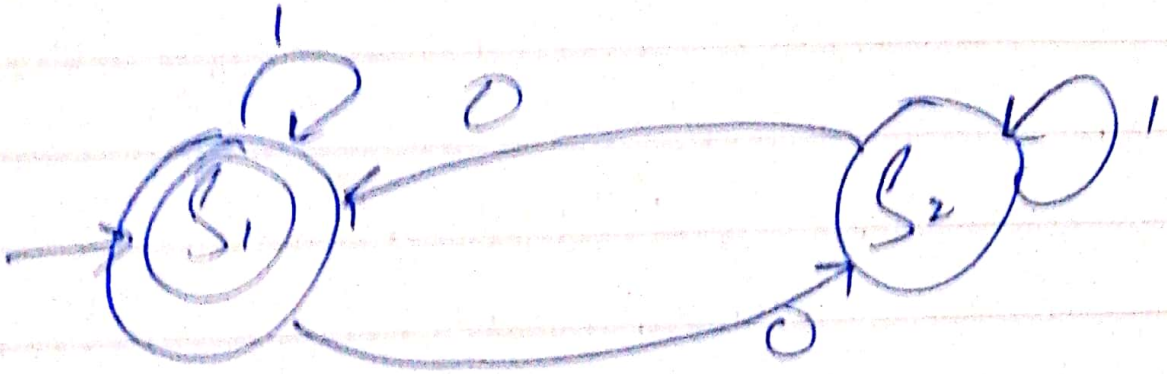
In intersection, the Table will be same & Z1 will be final state



[INTERSECTION]

d) Find the closure of FA1 given in figure 6.

figure 6:



States

$z_1 = \{s_1\}$

$z_2 = \{s_2\}$

1

$z_1 = \{s_1\}$

z_2

0

$z_2 = \{s_2\}$

z_1

DFA will be: