→ **** Regular Expressions

+ → Union

. → Concatenation

* → Kleene closure

The simplest way of expressing a language

For every regular language we can construct a regular expression by taking input symbols as operands and following symbols

+ , . , *

	RE		RE
$L=\{\}$	ϕ	$L=\{b\}$	b
$L=\{\varepsilon\}$	ε	$L=\{\varepsilon,a,aa..\}$	a^*
$L=\{a\}$	a	$L=\{a,aa..\}$	a^+
$L=\{a,b\}$	a+b	$L=\{0,1,0,1..\}$	$(0+1)^+$

- Construct RE that generate all strings of 0's and 1's where each string start with 0 and ends wit 1

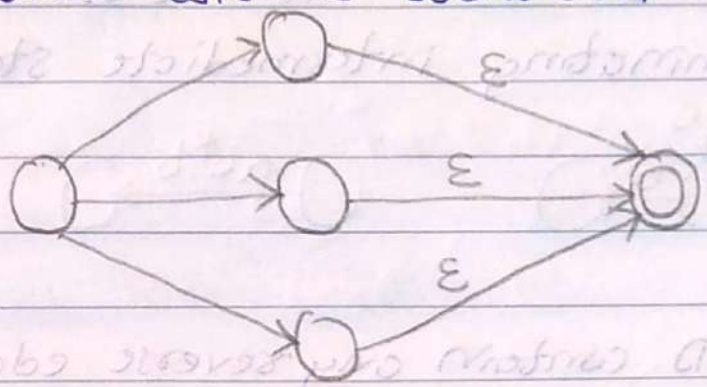
$= 0\,(0+1)^*\,1$

$L=\{01, 001, \ldots\}$

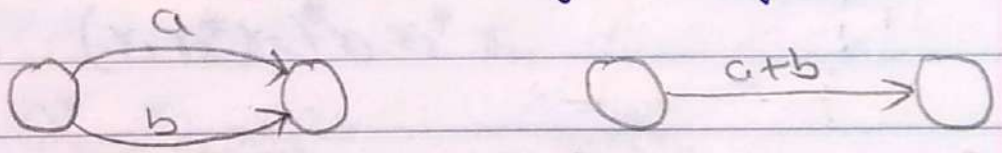
- Find RE that generates all 0's and 1's where each string starts and ends with different symbols

$= 0(0+1)^*1 + 1(0+1)^*0$

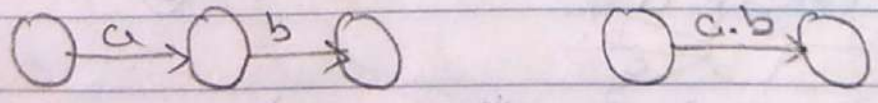
- Whenever T.D contains more than 1 finite state make it as single final state by adding new final state with ε transition



- Whenever the T.D contain more then 1 edge going in same direction then make it as single edge labled with Union of given symbol

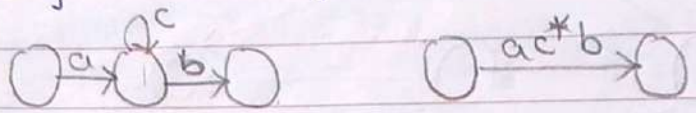


- In T.D if you find more then 1 edge going on same direction one after the other then make it as single edge labled with concatenation of given symbol by eliminating intermediate state

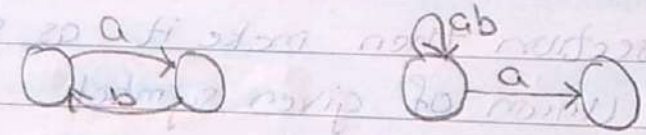


- In T.D if more then 1 edge going in same direction one after the other intermediate state contain self loop make it single edge labled with

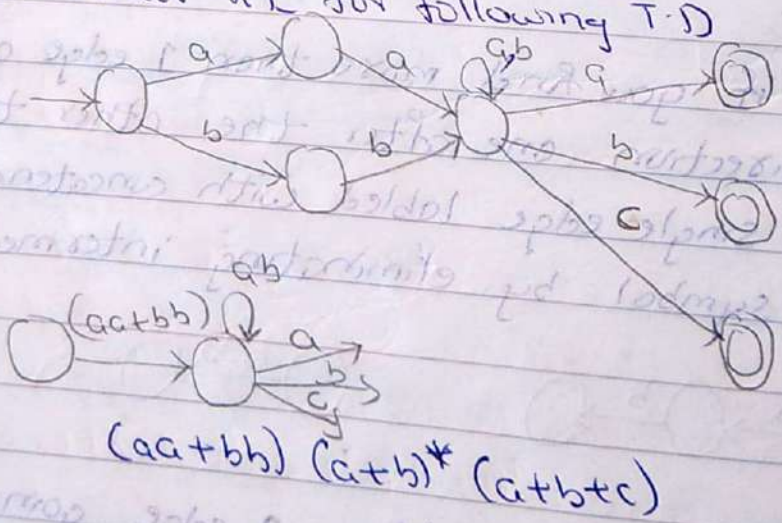
concatenation of the given symbols in which intermediate state symbol is represented with kleen closure operator by eliminating intermediate state



- If T.D contain any reverse edge eliminate those by adding all its possible transition at particular state

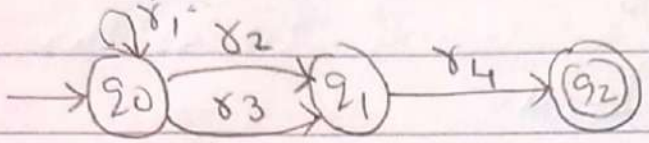


I] Construct R.E for following T.D



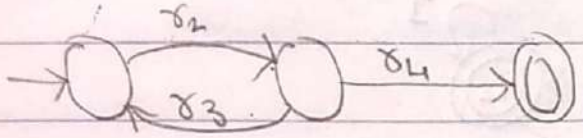
(aa+bb) (a+b)* (a+b+c)

2] Construct R.E for the following F.A



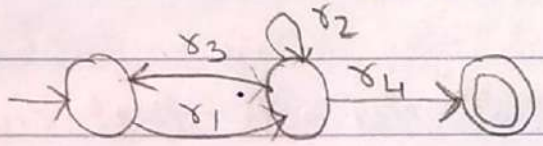
$\gamma_1^* (\gamma_2 + \gamma_3)\, \gamma_4$

3]



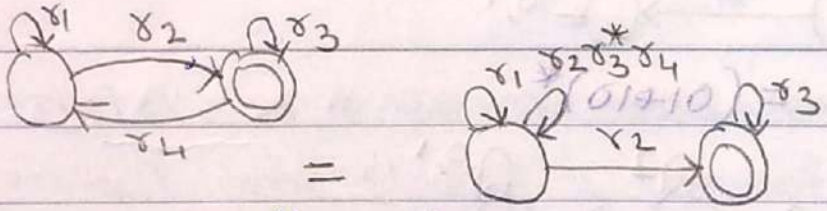
$(\gamma_2 \gamma_3)^* \gamma_2 \gamma_4$

4]



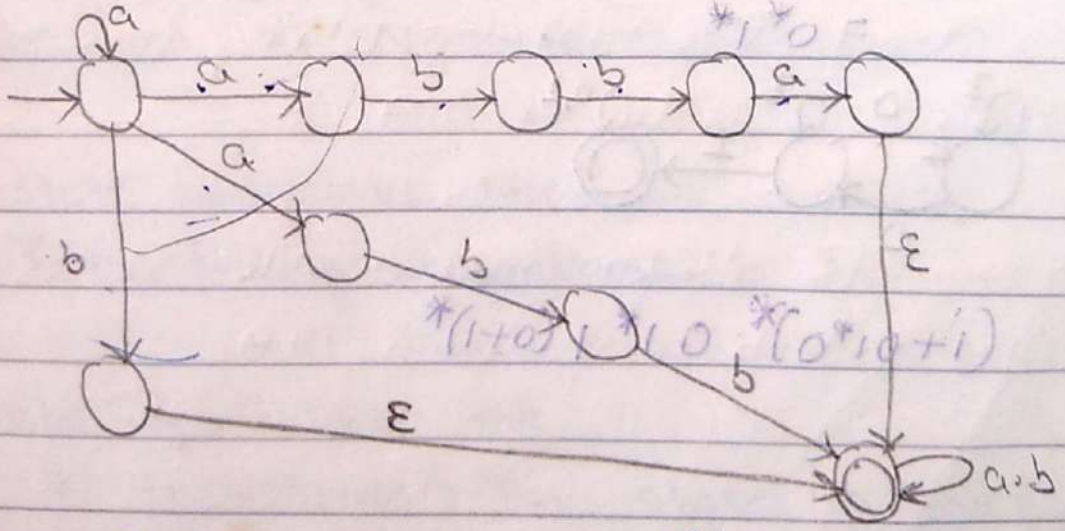
$(\gamma_1 \gamma_2^* \gamma_3)^* \gamma_1 \gamma_2^* \gamma_4$

5]



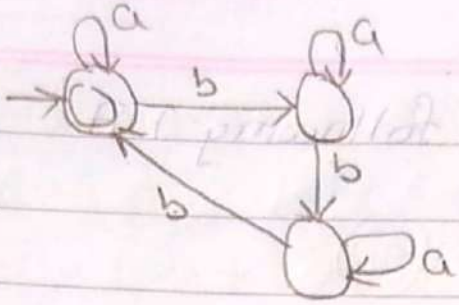
$(\gamma_1 + \gamma_2 \gamma_3^* \gamma_4)^* \gamma_2 \gamma_3^*$

6]



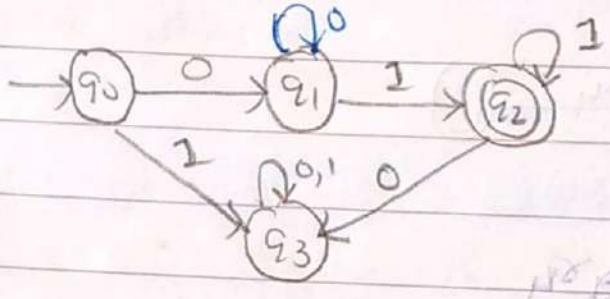
$a^* (abba + abb + b)(a+b)^*$

7]



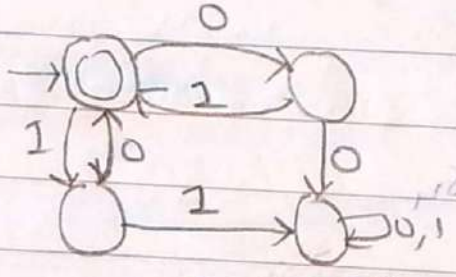
$(a+ba^*(ba^*b))^*$

8]



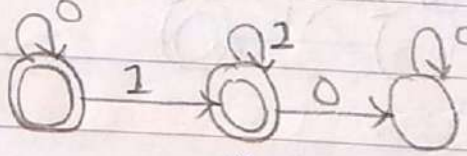
$= 0^+1^+$

9]



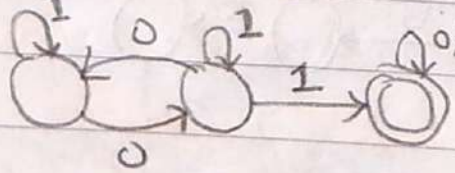
$= (01+10)^*$

10]



$= 0^*1^*$

11]



$(1+01^*0)^*\ 01^*\ 1\ (0+1)^*$