

## CS4402 - CLOSS Test-01

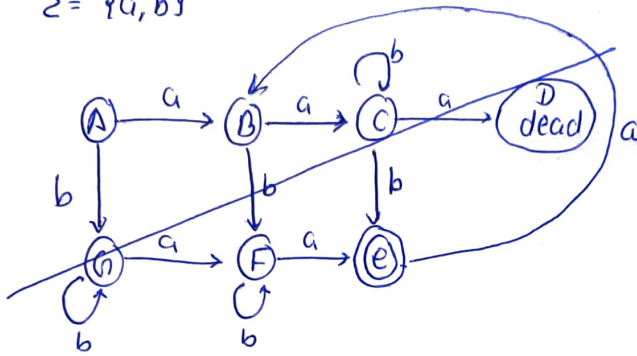
Sol. 1.

$L = \{ w \mid w \in (a+b)^* \text{ and every substring of length 3 in } w \text{ has at most two a's} \}$

$L = \{ \epsilon, a, b, ab, ba, aab, abb, baabbb, \dots \}$

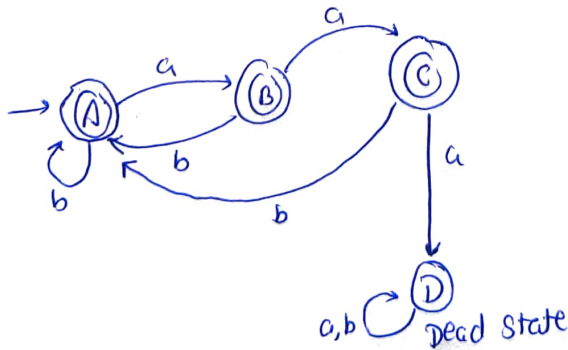
$M = \{ Q, q_0, \Sigma, F, \delta \}$

$\Sigma = \{a, b\}$



$Q = \{A, B, C, D, E, F, G\}$

$F = \{E\}$



$Q = \{A, B, C, D\}$

$F = \{A, B, C\}$

Sol. 2

$L = \{w \mid w \in (a+b)^* \text{ and } w \text{ should not end with two consecutive } a\text{'s or } b\text{'s}\}$

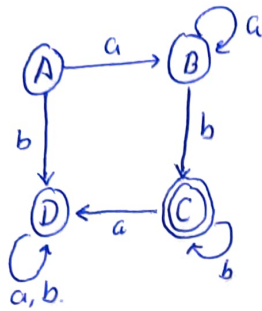
$L(R) = \{ \epsilon, a, b, ab, ba, aab, aaba \dots b, \\ bba, bbb \dots a, \text{etc} \}$

$$R = a+b + (a+b)^*ab + (a+b)^*ba + \epsilon$$

Sol. 3.

$$M = (\{A, B, C, D\}, \{a, b\}, \delta, A, \{C\})$$

Let's Construct the transition diagram.



By examination

It seems like language of this DFA should start with a and end with b.

If we take b initially it goes into dead state 'D'.

and at 'C' if we take a it goes to dead 'D'.

Hence  $L(M) = \{w \mid w \text{ starts with } a \text{ end with } b\}$

$$R = a(a+b)^*b \quad A = \epsilon$$

$$B = Aa + Ba \quad \dots (i)$$

$$C = Bb + Cb \quad \dots (ii)$$

$$D = Da + Db + Ab + Ca$$

Using Arden's theorem

$$B = Aa a^*$$

$$\Rightarrow C = Cb + Bb$$

$$= Cb + Aa a^* b$$

Again, Arden's theorem

$$\begin{cases} R = \emptyset + RP \\ R = \emptyset P^* \end{cases}$$

Ans  $[ C = Aa a^* b b^* ]$