TAFL TUTORIAL-5

Qu-1 Find the Regular Expressions for the following language over alphabet {a,b}

(a) The set of string in which the Number of occurrence of a is divisible by 3.

Ans $|w|_a = 0 \pmod 3$

$RE = (b^* a b^* a b^* a)^* b^*$

(3) The set of strings in which there are at least two occurences of b btween any two occurrence of a.

Ans $b^* + b^* (abb^+)^* ab^*$

(c) $L = \{a^n b^m \mid n+m \text{ is even}\}$

Ans n+m = even
even + even = even
odd + odd = odd

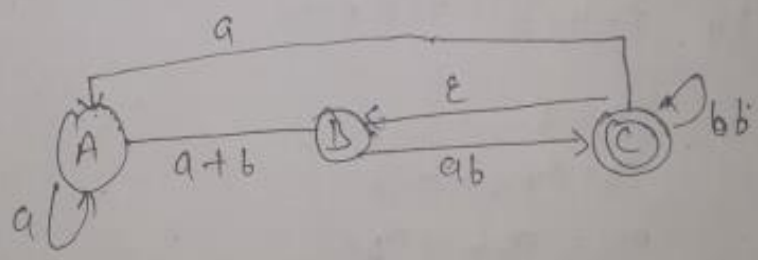
$RE = ((aa)^* (bb)^* + (aa)^* a (bb)^* . b)$

Case 2 = $((aa^*).b\ (bb^*).b)$ odd string.

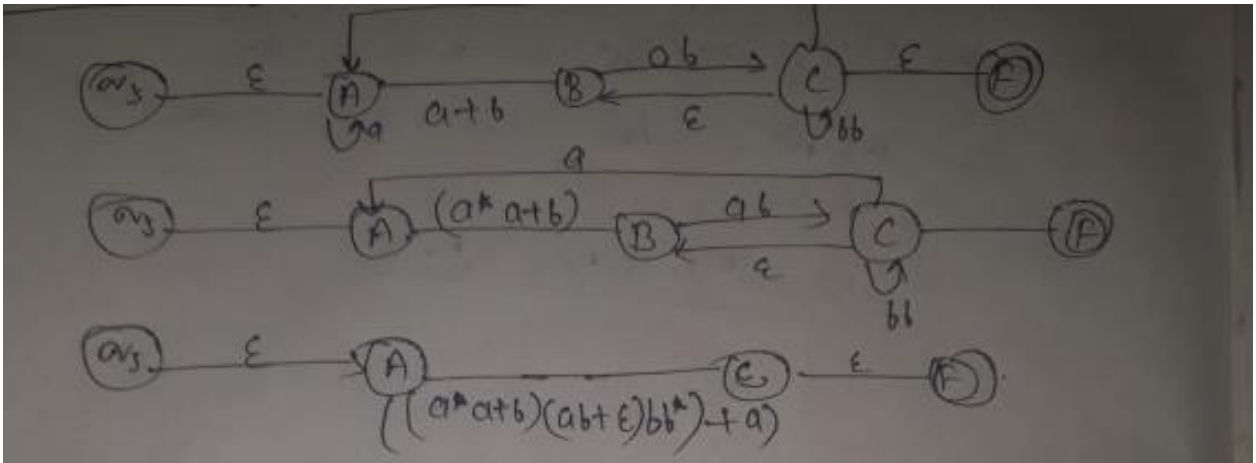
ii) we do union these two cases we get even string:

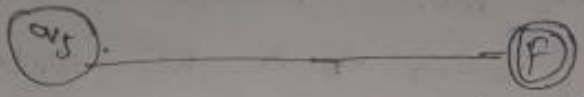
$$(aa^*)(bb)^* + (aa^*).a.(bb^*).b$$

Qu-3 which is the more suitable method for. Converting the following FA to RE - Arden's theorem or elimination of states I hive you. Reason and find the RE equivalent to. the FA using the Method suggested by You.



Ans the more suitable method for converting. the following FA to RE is elimination. of states because we can easily eliminated the state rather than arden's theorm.





$$\varepsilon((a^*a+b)(ab+\varepsilon)bb^*)+a)\,\varepsilon$$

$$= (a^*a+b)(ab)(a+bb)^*.$$

Q-2 Convert FA To RE

(G) By Arden's theorem.

$$r_0 = \varepsilon$$

$$r_1 = r_0 a + r_2 b.$$

$$r_2 = r_0 b + r_2 a$$

$$r_3 = r_1 a + r_2 b + r_3(a+b)$$

$$\Rightarrow r_1 = a + r_2 b$$

$$r_2 = b + r_1 a$$

$$r_3 = r_1 a + r_2 b + r_3(a+b)$$

$$\Rightarrow r_2 = b + (a + r_2 b)a.$$

$$r_2 = b + aa + r_2 ba.$$

$$r_2 = (b+aa)(ba)^*$$

$\Rightarrow r_3 = (a(b+aa)(ba)^*b)a + (b+aa)(ba)^*bb + r_3(a+b)$.

$= aa + (b+aa)(ba)^*b(a+b) + r_3(a+b)^*$.

$\Rightarrow r = r_3 = [aa + (b+aa)(ba)^*b(a+b)](a+b)^*$.

Qu-1 Construct DFA with minimize states. equivalent to RE $(aa^*)^*b)^*$