Assignment - 1

CS21B061
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Ques1) Given, $\Sigma = \{a, b\}$

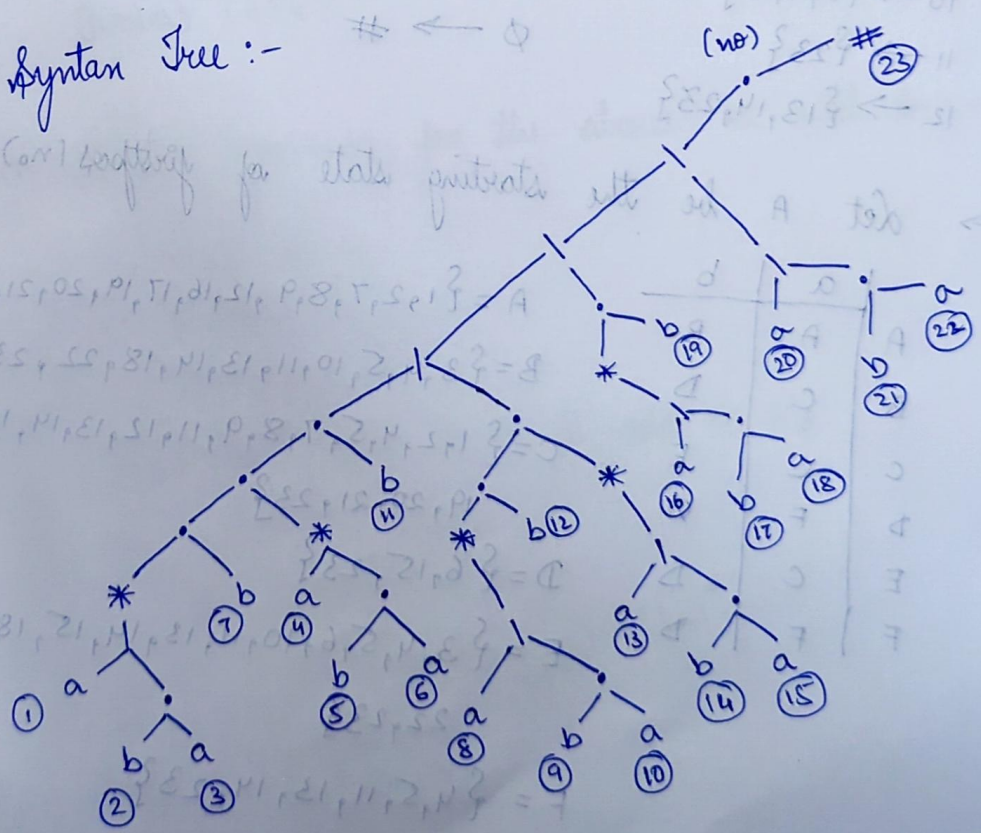
Soln: $(a+ba)^*(b+\varepsilon)(a+ba)^*(b+\varepsilon)$

Ques2) Direct Method :-

→ Augmentation of R.E. :-

$(a+ba)^* b (a+b)^* b | (a+ba)^* b (a+ba)^* | (a+ba)^* b | (a+ba)^* | \#$

→ Syntax Tree :-



firstpos (n0) = {1,2,7,8,9,12,16,17,19,20,21,23}

→ Follow pos :-

1 → {1,2,7}
2 → {3}
3 → {1,2,7}
4 → {4,5,11}
5 → {6}
6 → {4,5,11}
7 → {4,5,11}
8 → {8,9,12}
9 → {10}
10 → {8,9,12}
11 → {23}
12 → {13,14,23}
13 → {13,14,23}
14 → {15}
15 → {13,14,23}
16 → {16,17,19}
17 → {18}
19 → {23}
20 → {20,21,23}
21 → {22}
22 → {20,21,23}
∅ → #

→ Let A be the starting state of firstpos (n0)

	a	b
A	A	B
B	C	D
C	C	E
D	F	∅
E	C	D
F	F	D

A = {1,2,7,8,9,12,16,17,19,20,21,23}

B = {3,4,5,10,11,13,14,18,22,23}

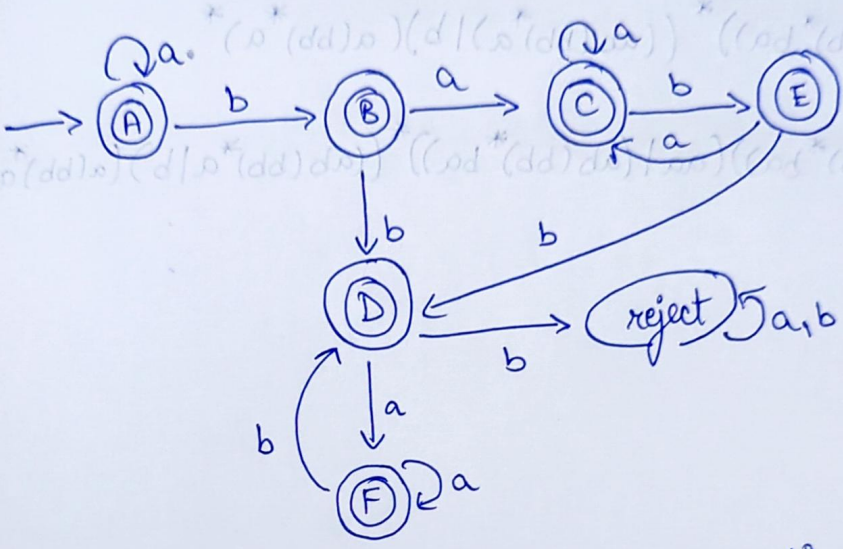
C = {1,2,4,5,7,8,9,11,12,13,14,16,17,19,20,21,23}

D = {6,15,23}

E = {3,4,5,6,10,11,13,14,15,18,22,23}

F = {4,5,11,13,14,23}

→ Equivalent DFA :-



Ques3) Regular expression with no consecutive b's.

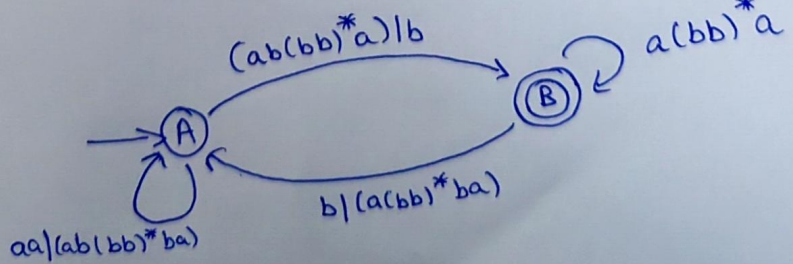
$(a+ba)^*(b+\varepsilon)$

Ques4) Regular grammar for the above RE will be :-

$A \rightarrow aA \mid bB \mid \varepsilon$

$B \rightarrow aA \mid \varepsilon$

Ques5) DFA for even # a's & odd # b's.



→ The regular expression will be :-

$(aa|(ab(bb)^*ba))^*((ab(bb)^*a)|b)(a(bb)^*a)^*$.

$\left(((b|(a(bb)^*ba))(aa|(ab(bb)^*ba))^*((ab(bb)^*a|b)(a(bb)^*a)^*)\right)^*$